OCTOBER 15, 1948

AUTOMOTIVE INDUSTRIES

IN THIS ISSUE

Italy's First Salon in 11 Years

Telltale Isotopes Reveal Secrets to Industry

Important Factors in Designing Camshaft Chain Drives

A Practical Approach to Torsion Bar Spring Design

New Fiat Economy Engine

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PRODUCTION INCREASED 170%

5 HOLES BORED
with exact spacing in a single setup.

Four holes in this washing machine gear case are bored, faced, and chamfered by a four-spindle cluster head on the Model 222 Bore-Matic, holding close accuracy for spacing and alignment. The fifth hole is finished by the right head.

and costs cut 63¢ on the dollar

...with a

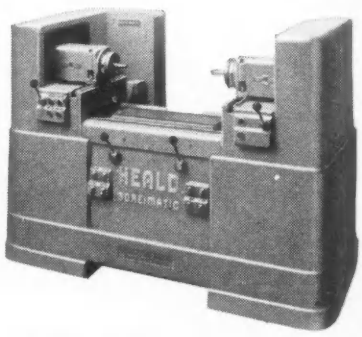
NEW Heald Bore-Matic

That's the actual production record of a leading washing machine manufacturer. When a new Heald Model 222 Bore-Matic took over the job of finishing gear cases, production went *up* 170 per cent—and costs came *down* 63 per cent!

Five holes are precision bored, faced and chamfered in a single setting, obtaining close accuracy for spacing and eliminating several operations and setups previously required.

Easy, convenient operation, combined with a fast hydraulic fixture and rapid cycle, enable an operator to run this Bore-Matic and also a drill used for a previous operation.

Perhaps you don't have a job exactly like this one—but you *do* have the same opportunity to reduce costs, increase production and improve quality with the new Heald Bore-Matics. For further information on these outstanding new machines, we invite you to contact your nearest Heald representative or Worcester direct.



Heald Model 222 Bore-Matic

NEW BORE-MATIC FEATURES CAN HELP DO A BETTER JOB ON YOUR WORK, TOO

The cost-saving installation shown here is not an isolated case—it's typical of what the new Bore-Matics can do for *every* manufacturer. This is made possible by new features such as—faster table traverse, higher speeds, constant feeds, low temperature hydraulic system, cool running heads, perfected way lubrication, leak proof piping, and many more. These features can help you do a *better* job, *faster*, and at *less cost*. They're worth investigating.

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Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

October 15, 1948 Vol. 99, No. 8

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Cable Address ..... Autoland, Philadelphia

Member: Audit Bureau of Circulations; Associated Business Papers, Inc.

AUTOMOTIVE INDUSTRIES is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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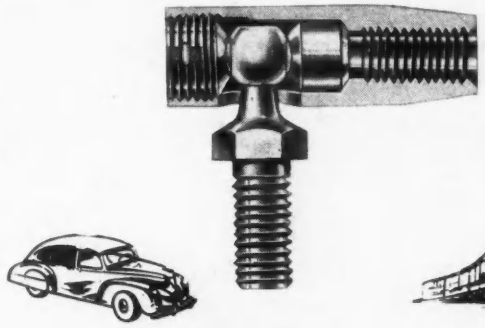

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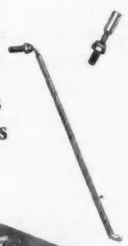
with

TOUREK BALL JOINTS

In the products illustrated, and in scores of others, Tourek Standard Ball Joints contribute to simplification of design and improvement in performance. Special designs in ball joints are available to meet the demands of your particular specifications.

Large diversified batteries of the latest type 6-spindle automatics can assure you outstanding precision and values on your screw machine parts requirements.



Write for Tourek's 16-page illustrated catalog, containing complete specifications on 12 standard types in 54 sizes, as well as data on special types. Or, if you want prices on your screw machine product needs, send prints.

J. J. TOUREK MFG. CO.
4701 W. 16th St., Chicago 50, Ill.

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TOUREK
FAMOUS BALL JOINTS

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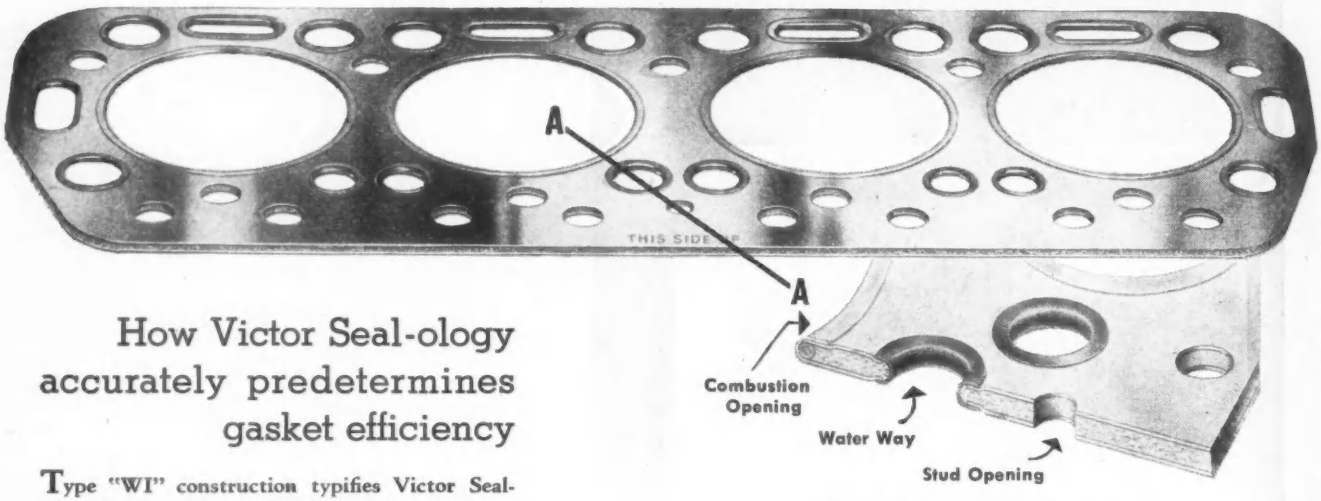
performance assurance for your tractor gaskets

HEAVY DUTY TYPE "WI" METAL ENCASED ASBESTOS—WIRE REINFORCED

SERVICE RECOMMENDATIONS:

Generally accepted as the standard construction for heavy duty on tractor and truck engines. Also used frequently for overhead valve engine gaskets with round cylinder openings to obtain reinforcement provided by wire loop inserts. Ranks highest in comparative breakdown tests of gaskets in heavy-duty range.



How Victor Seal-ology accurately predetermines gasket efficiency

Type "WI" construction typifies Victor Seal-ology in heavy duty gasket design. For maximum resistance to breakdown—and for economy—a steel case is used. Combustion openings are wire reinforced and sealed against blow-out. Water ways have copper grommets to protect against corrosion.

From this basic structure and others thoroughly proved under severe service, and on which Victor maintains continuous performance tests, your gaskets for tractors and truck engines are individually engineered to specific needs. Where fundamental changes are necessary, Victor laboratories are equipped to make complete dynamometer tests.

Victor Seal-ology leaves nothing to chance. For example, to achieve the desired compressibility under specific torque, the asbestos filler is milled and composed to close tolerance and controlled density right in the Victor plant.

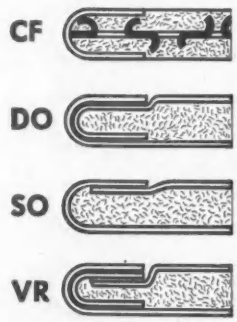
Such quality control and precise engineering in every detail enable Victor to put known performance values into heavy-duty gaskets under all field conditions. And as the world's leading supplier of automotive gaskets, shaft seals, and packings, Victor is in the best position to work with you on all sealing specifications.

Victor Mfg. & Gasket Co., P. O. Box 1333
Chicago 90, Illinois

CROSS-SECTION "A-A"—TYPE "WI"

Maximum resistance to blow-out and breakdown in high heat and pressure areas is obtained by reinforcing combustion openings with patented seamless soft copper wire ring around which the bottom steel layer is snugly overlapped. Water holes are sealed against erosion and protected from corrosion with inserted copper grommets, flanged top and bottom. Victor Precote applied to finished gasket obtains perfect sealing against surface irregularities.

OTHER BASIC VICTOR DESIGNS



Corbestos—treated asbestos combined with perforated steel core having combustion chamber flanges.

Double overlap; both top and bottom layers formed around cylinder openings. Copper or steel.

Single overlap around cylinder openings; copper or steel. Standard for passenger car engines.

Additional steel flange reinforcement around cylinder openings with copper or steel layers.

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

Italy's First Salon

Recovery of the Italian automobile industry from the ravages of war was dramatically demonstrated at Italy's 1948 International Automobile Salon held in September at Turin. This first event in 11 years, staged in the brand new specially erected Valentino Palace—the biggest roof span in Europe—is covered in the article on page 25.

A Practical Approach to Torsion Bar Spring Design

A racing car builder imparts information on what he has learned in the application of torsion bar suspension. Tables on torsion bar data and on factors determining torsion bar design are included in this illustrated account on page 28.

Designing Camshaft Chain Drives

This article analyzes the various factors entailed in the design of timing chain and sprocket drives in the order of center distance between crankshaft and camshaft, available space, the magnitude and character of crankshaft torque, and manufacturing problems. Amply illustrated with charts, it begins on page 36.

Telltale Isotopes Reveal Secrets to Industry

This concluding installment on Isotopes in Industry, first part appearing in AUTOMOTIVE INDUSTRIES for October 1, reports on research concerning heretofore hidden phases in the making of synthetic gasoline from coal and natural gas, and in the processing of steel, rubber and other materials. Turn to page 40.

The Insides of the New Truckstell Overdrive

An all-mechanical overdrive that operates in all forward speeds, eliminates free wheeling in any speed, and incorporates a hill holder, is the subject of the article appearing on page 50.

38 New Product Items And Other High Spots, Such As:

An automatic machine that bales over 110 tons of scrap daily; a new and well equipped tractor plant; AF experimental planes; news and new products at the 30th National Metal Congress; the Security Board's standby order for 100,000 machine tools; and a list of exhibitors and their booth numbers at the Metal Show.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

A Thousand Improvements a Year!

We at Ryerson believe that constant improvement in every operation is the key to good steel-service. We continually invent, revamp, revise, reorganize—*improve*. Best of all, our employees help show us the way.

Last year, for instance, our employees submitted a total of 3,686 suggestions, each of which described a procedure, policy or piece of equipment designed to improve the efficiency of our steel service. Of the 3,686 ideas, 1,379 proved worthy of cash awards and are now being used to the ultimate benefit of Ryerson customers. Accepted suggestions ranged from a method of speeding the paper work in processing an order to more accurate gauges for our biggest friction saws.

This willingness of our entire organization to help achieve maximum efficiency is one reason we are able to promise you a steel-service that's intelligent, ever alert to do the job still better. Encouraged to advance their own ideas, our employees often assist in determining practical alternates when great demand causes shortages of the steel you need. To put this kind of service to work for you, contact the nearest Ryerson plant next time you need steel. You can be sure we shall do our best to serve you.

PRINCIPAL PRODUCTS

BARS — Carbon and alloy, hot rolled and cold fin., reinforcing

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RYERSON STEEL

NEWS of the AUTOMOTIVE INDUSTRIES

Vol. 99, No. 8 October 15, 1948

Austin and Nuffield to Combine Know-How

A technical merger between two of England's largest automobile manufacturers, the Austin Motor Co., and the Nuffield organization, has been disclosed. In order to meet keener foreign competition in export markets, the two companies will constantly interchange information on production methods, costs, purchases, design and research.

K-F Denies Sears Deal to Merchandise Cars

The Kaiser-Frazer Corp. has definitely refuted a report that it was entering into a deal with Sears Roebuck for the distribution of automobiles. The report dealt with the distribution by Sears of a smaller lower-priced automobile which K-F is planning for sometime next year. It is believed that the report arose out of the deal between Sears and Kaiser Fleetwings, Inc. of Bristol, Pa., under which Sears acquired an interest in the company which supplies plumbing fixtures and other products. Kaiser Fleetwings also turns out trunk lids and doors for K-F cars.

Cadillac Distributors To See 1949's on Oct. 22

Cadillac distributors will get their first look at the 1949 model at a meeting in Detroit on Oct. 22. The public presentation, however, will not be made until some time later. The chief feature of the new model will be the new overhead valve V-8 engine, which is reported to have a compression ratio higher than any currently used in standard passenger cars, even exceeding that of the new Oldsmobile V-8 for 1949. The horsepower of the engine will be up considerably from the current model, but will probably not be as high as the 170 hp previously reported in trade circles. Styling is understood to be changed very little, consisting principally of exterior variations for model designation purposes. Changeover to the new model should be quick and painless for Cadillac, since it is known to have been in production of the new engines for several weeks.

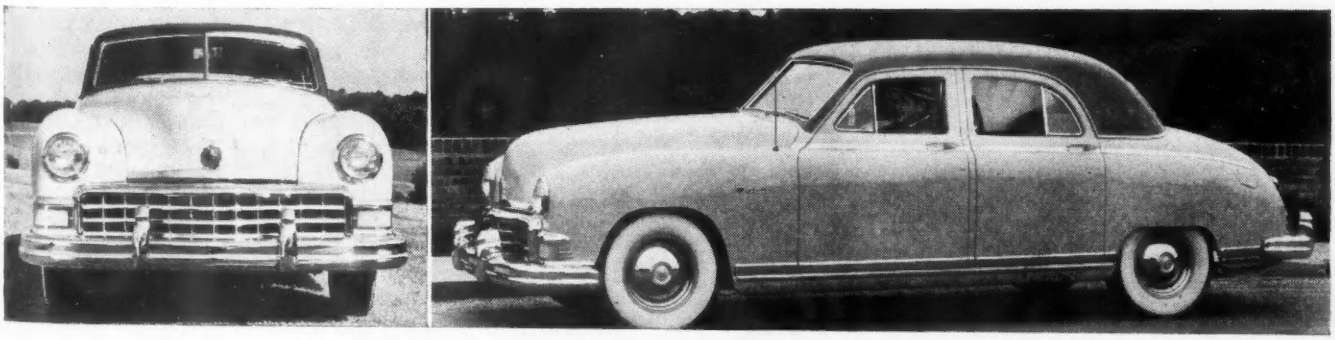
Willys Announces Three New Models

Willys-Overland Motors announced three new models on its third annual Institutional Day in Toledo, Ohio. The new models are a four-wheel-drive station wagon, a six-cyl station wagon and a utility wagon. The four-wheel-drive station wagon has the selective two and four-wheel-drive features of the Universal Jeep and the Jeep 4WD truck. The six-cyl station wagon is powered by the new Willys-Overland engine which is rated at 70 hp. This vehicle will come in a solid body color, rather than the simulated wood paneling of the station wagon. The utility wagon is a simplified version of the station wagon, with all seats but the driver's removed, and without the overdrive which is standard equipment on the station wagon.

See '48 Car & Truck Output Over Five Million

With all automotive plants operating at high tempo as the industry entered the last quarter of this year, optimism is again on the rise for production to go well over five million units this year. The most optimistic reports foresee a total of more than 5.2 million cars and trucks in the U. S. alone this year, with combined U. S. and Canadian production to hit 5.5 million, which would be the second best year in history. For the first nine months of this year, estimated production was 2,786,588 passenger cars and 1,054,589 trucks in the U. S., for a combined total of 3,841,177. When Canadian production is added, the total is 4,027,304. Overall production for the period is estimated at about eight per cent over the same period of 1947.

September production was disappointing because of strikes, and only an estimated 428,000 units were built. Prospects for October, however, are excellent and it is believed the industry has a good chance to go over the 500,000



FRAZER FOR '49

The 1949 Frazer Manhattan shown here, now being introduced together with the 1949 Frazer, complete Kaiser-Frazer's four-door sedan series for 1949. With a 7.3 to 1 compression ratio, the 112-hp, six-cyl engine powering the new Frazer features dual-throat carburetion and dual-intake manifolding. A new honeycomb grille, one-piece wrap-around bumpers, wide chrome trim along the base of the body, and an added chrome "crease molding" below the window openings are among the styling changes of the new Frazer, which is now in production at Willow Run.

mark for the first time in the postwar period. Barring either unexpected labor difficulties, or a serious diversion of materials, the industry appears to be in a good position to hang up something of a production record during the next three months.

Ford Adjusts Prices $15 on Two Models

The Ford Motor Co. has adjusted prices on two of its Ford models. All club coupes have been reduced $15, and all two-door sedans have been increased by the same figure.

New Self-Loading Truck To Ease Pier Congestion

A new self-loading truck with a carrying capacity of 25 tons, invented by Gerald X. Garvey, sole owner of the Garvey Trucking Co., New York City, promises to radically alleviate pier congestion. The new truck, which has an inverted axle arrangement nine ft off the ground, is backed over cargo. The driver then locks two to four of the truck's steel slings around the load which has been raised an inch off the ground by dunnage. By manipulating a lever, the driver can hoist the load about a foot, and transport it to its destination.

Chrysler Opens New Parts Plant in Newark, Del.

Formally opened on Oct. 8 by its Parts Div., Chrysler Corp.'s first Eastern parts plant, located in Newark, Del., includes nearly 16 acres of floor space, with facilities for handling and shipping MoPar replacement parts for Plymouth, Dodge, De Soto and Chrysler vehicles and Chrysler industrial and marine engines. This huge Delaware parts distributing center will serve 14 states.

MORE MIGHT FOR WHITE

The new model WC-22T White Super Power tractor unit, shown above, is one of a complete new line of White Super Power trucks and tractors, embracing eight trucks, seven tractors, and three six-wheel units, now being produced by the White Motor Co. with more horsepower for the same gross weight capacity than former models.

K-F Production Passes 300,000 Mark

The Kaiser-Frazer Corp. turned out its 300,000th automobile Oct. 11, just a little more than 28 months after building the first vehicle. The first 100,000 units were completed late in September of 1947 and the 200,000th car was built about six months ago. The third 100,000 units were turned out in six months despite considerable slackening of production during model changeover. Up to Oct. 11 this year the company has built 143,741 cars. Currently production is running at nearly 800 a day, and for the first nine months of this year was running 51 per cent over the same period of 1947. The company states that it now is the fourth largest producer of passenger cars accounting for nearly five per cent of all new car retail sales and 25 per cent of all the sales by the independents.

EDUCATIONAL TRANSPORTATION

Produced by Oneida Products Corp., the Oneida Safety School bus body, with universal V-type windshield design, shown here is now available for any of 10 leading makes of school bus chassis in passenger capacities ranging from 30 to 61.

Banker Warns Car Makers of Slump Next Year

A veteran banker with long experience in automobile financing has sounded a doleful warning to the automobile industry. He is Arthur J. Morris, founder of the Morris Plan Bank and chairman of the Industrial Bank of Commerce in New York. By the end of 1949, he said, "the automobile industry will face the most catastrophic consequence of its entire history as far as the new car market is concerned." He told members of the National Used Car Dealers Association at their convention in New York that present high prices of new cars are causing a shift of volume buying from new cars to the used car field. The only solution for the automobile industry, he said, is to build a smaller car that can be delivered for between $1000 and $1500.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Acme

STRICTLY UTILITY

Now being produced in quantity by the Standard Motor Co., Ltd., Coventry, England, this new Standard pick-up utility car, shown in a side view, carries nine persons, and is reportedly particularly useful in town and on the farm.

AC Spark Gets $1 Million Air Force Order

Nearly $1 million worth of aircraft spark plugs, reportedly the largest peacetime order, was recently awarded to GM's AC Spark Plug Div. Expected to cover spark plug needs for all USAF C-74 and B-36 aircraft during the next year, the 235,850 spark plugs ordered are type AC-181.

Ford Assets Up $146 Million in 1947

Some idea of how the Ford Motor Co. is doing financially can be gleaned from the annual report it files with the Massachusetts State Tax Commissioner in Boston. The balance sheet (for the parent company only) for the year ending Dec. 31, 1947, showed a jump in total assets from $880,047,000 at the close of 1946 to $1,025,733,000 at the end of 1947. Surplus also increased, from $683,162,000 at Dec. 31, 1946, to $732,019,000 at Dec. 31, 1947. With Dec. 31, 1947, figures given first, and Dec. 31, 1946, figures second, the complete statements for both years follow: Assets: Cash, accounts and notes receivable, securities and patent rights, $402,105,000, $389,738,000; Real estate, machinery, equipment, tools, furniture and fixtures, $386,183,000, $295,943,000; Merchandise and supplies, $231,534,000, $179,817,000; Prepaid expenses and deferred charges, $5,911,000, $14,549,000; Total assets, $1,025,733,000, $880,047,000; Liabilities, reserves and capital: Current liabilities, $256,202,000, $168,818,000; Reserves, $20,247,000, $10,802,000; Capital stock, $17,265,000, $17,265,000; Surplus, $732,019,000, $683,162,000; Total liab., res., and capital, $1,025,733,000, $880,047,000.

Two New Engines for Aircraft

Two new aircraft engines highlight recent aviation news. One is the Wright Turbo-Cyclone 18 compound engine, developed by the Wright Aeronautical Corp., a division of the Curtiss-Wright Corp. This engine combines a reciprocating engine with three velocity turbines which operate on the exhaust gases, recovering approximately 20 per cent of the available heat energy normally lost through the exhaust. Conversion of these gases into power which is geared back directly to the crankshaft adds 20 per cent to the horsepower developed by the engine for the same fuel consumption. Wright has received a $32 million Navy contract for initial production of the new compound engine and the 2700-hp Wright Cyclone 18 type.

The other engine, announced by the Pratt & Whitney Div., United Aircraft Corp., employs a GE variable discharge turbo-supercharger, and is said to be based on P & W's 28-cyl Wasp Major engine. Known as the Pratt & Whitney Wasp Major R-4360-VDT, the new engine will be reportedly used by the U. S. Air Force in the Boeing B-54. It is said to develop a basic 4000 hp for propeller driving purposes plus several hundred pounds of jet thrust from cooled-down exhaust gases.

Demonstrate Huge Baldwin Testing Machine

With a capacity of five million lb in tension and compression, a universal testing machine, described as the largest in the world, and designed and built by the Baldwin Locomotive Works, was recently officially demonstrated at the Philadelphia Naval Base. To be used in testing lightweight simulated airplane structures of aluminum and magnesium, the machine weighs about 700,000 lb, is 62 ft in overall height: 47 ft about the test floor and 15 ft below.

DISTINCTLY SPORTING

The new 1948 Aston Martin two-litre sports car, produced by David Brown Tractors, Ltd., England, is powered by a four cyl overhead valve engine said to develop 90 hp at 4750 rpm. This car has a wheelbase of 9 ft, and an overall height of 4.5 ft.

NEWS *of the* AUTOMOTIVE INDUSTRIES

K-F Dealers Inaugurate Used Car Sales Plan

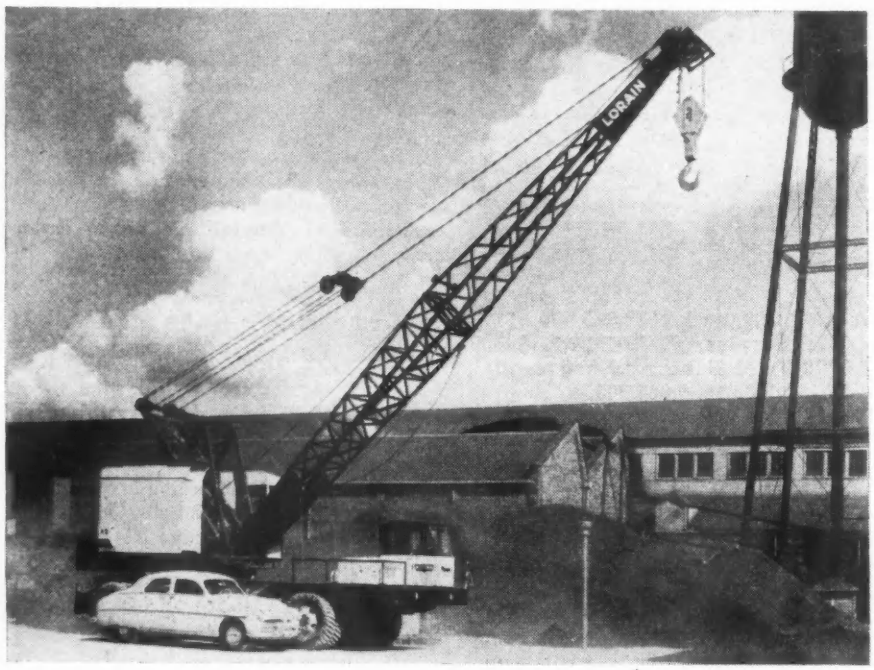
Kaiser-Frazer dealers in the Chicago area are initiating an integrated merchandising program said to be the first in the industry since the end of the war. Under the plan, used cars are classified in three categories: good, better and best. "Best" cars must be current model or one model year preceding, have low mileage, be particularly clean inside and out, and be completely reconditioned with 62 inspection operations. Cars carrying the "better" designation must be clean and reconditioned with 62 inspection operations. The "good" used car represents older models with considerable unused mileage which have been reconditioned with 31 inspection operations. Best cars carry a 100 per cent dealer warranty for 60 days or 2500 mi. Better cars are warranted for 30 days or 1000 mi, with all warranty work done on a 50/50 basis. Good cars are guaranteed to pass all state and local tests.

Chrysler Building Plant for Stamping at Detroit

The Chrysler Corp. is building a new stamping plant near its Dodge truck plant on Mound Road in Detroit. It is believed that the unit, which has a manufacturing area of about 300,000 sq ft, will be used primarily for the production of stampings for Dodge truck cabs and bodies. The plant may also be used for passenger car stampings. It is believed that it will be ready for production early next year.

Crosley Again Expands Marion Assembly Plant

Crosley Motors, Inc. is again expanding its assembly plant at Marion, Ind. The company has awarded a contract for a new 60 by 352 ft building which will bring the total area at the Marion operation to more than 253,000 sq ft. The new building will represent the 12th expansion of the assembly plant since it was acquired by Crosley in 1945.



HIGHER AND HIGHER

Dwarfing the automobile beside it, this rubber-tired, two-engined Moto-Crane, said to be the world's largest, is made by the Thew Shovel Co., Lorain, O. With a lifting capacity of 45 tons, at a 12-ft radius, the new unit weighs 65 tons and is 66 ft, 5 in. in length with the boom in travel position over the front of carrier, and 11 ft, 7.75 in. in width to the outside of its tires.

Tucker Reports Assets Over $8 Million

Cash holdings of the Tucker Corp. on Aug. 31 were $1,283,247, according to an accounting filed with the U. S. District Court in Chicago. The company holds an additional $605,502 in U. S. treasury bonds. Tucker also reported that 28 new cars had been completed up to the date of the accounting, that 22 others were more than half finished, and that cars are being completed at the rate of one a week. Tucker's current assets, according to the report, totaled $8,446,206 and current liabilities were $2,237,402. Not included in current assets listed is $1.3 million cash which is on deposit with the WAA for the acquisition of machinery and equipment. Of the total assets listed, $3,649,770 is represented by notes due from dealers and distributors in payment for franchises. The report also says that mass assembly line production would be started about 30 days after the company decides to begin volume output. Currently, Tucker claims to have 40,000 stockholders, and about 2000 dealers and distributors.

K-F Installing Network For In-Plant Broadcast

The Kaiser-Frazer Corp. has taken another step in its comprehensive employe relations program. It has installed what it says is the largest industrial public address system in the world to bring employes throughout the plant news, music, and service programs from a central studio equipped with 5200-watt sending apparatus and facilities for originating network shows. The network includes 600 loud speakers located in all areas of the plant. In addition to providing entertainment, the plant-wide network is considered a safety factor during emergencies, including broadcasts of weather and highway condition reports during winter months. One of the most difficult problems encountered in the installation of the system was making broadcasts clearly audible over machinery noises without blaring or distortion.

GM Opens B-O-P Unit At Framingham, Mass.

GM will open the last of its postwar B-O-P assembly plants Oct. 13, at Framingham, Mass. The plant has been operating under very limited schedules for some months, but it is reported that after the formal dedication, production will be stepped up. Three other B-O-P units have been opened since the end of the war at Atlanta, Kansas City, and Wilmington, Del.

Doctor Suggests Car Features for Passenger Safety

The medical profession has again come forward with suggestions to the automobile industry for building a safer vehicle. In a paper before the Michigan State Medical Society in Detroit, Dr.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Fletcher D. Woodward, University of Virginia staff faculty member, pointed to the greatly increased accident rate and advocated: speed governors on all cars, with a 55 mph maximum; welded unit construction of frame and body to include crash struts, similar to those in aircraft; plastic windshield and windows to eliminate cuts from broken glass; single doors with windows large enough to serve as escape hatches and high enough to prevent passengers from riding with elbows protruding; door latches operating from both rear and front seats with safety lock on the front latch to prevent opening of doors by children; front bumpers which would act as shock absorbers; safety belts such as used in aircraft; sponge rubber crash pads on the dash and back of front seats; elimination of all possible projecting knobs and handles; and a steering column which would move forward under impact.

Acme

SPEEDY LIGHTWEIGHT

Displayed at the Paris Automobile Exposition, the new Gregoire, constructed largely of aluminum, was designed by Jean Albert Gregoire who is shown stepping into his car. Powered by an 11-hp engine, the car is said to have a speed of 100 mph.

UAW-CIO Reports Treasury Soundest in Many Years

The latest quarterly financial report of the UAW-CIO shows the union to be in a healthier financial position than it has been for several years. Total liquid assets improved by more than half a million dollars during the quarter ending Aug. 31, bringing the total to more than $2 million. The total includes a strike fund of about $860,000.

New Marmon-Herrington Conversions

The Marmon-Herrington Co., Inc., Indianapolis, Ind., has just announced a new line of heavy-duty All-Wheel-Drive converted Ford trucks, identified as the "Q" Series. There are six models in the new Marmon-Herrington "Q" Series: three models are four-wheel-drive and three models six-wheel-drive. The gross vehicle weight for the four-wheel-drive models is 21,500 lb, and for the six-wheel-drive models 35,000 lb. Wheelbases range from 136.5 in. to 220 in.

Chile Car Output to Start in 1949

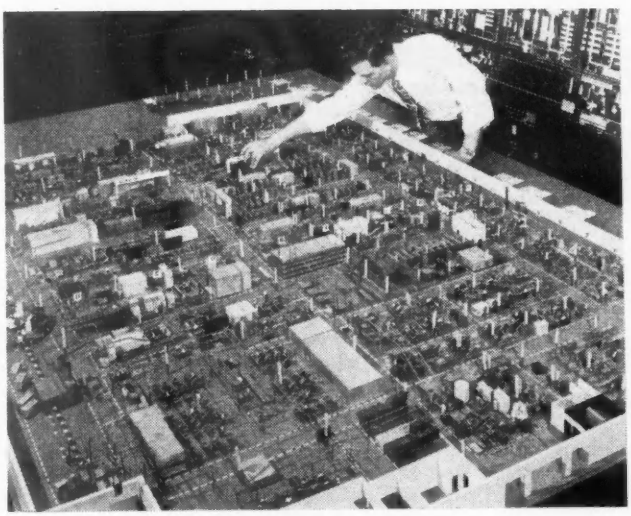
Automobile manufacturing south of the border increases with the announcement that by the middle of 1949 output will start in Chile's first automobile plant. Reportedly following the general lines of the Fiat, the new Chilean automobile will at first be powered by Italian-made Fiat engines.

Bendix Appoints Pontius Head of Engineering

Connected with Bendix in various engineering capacities for the past 17 years, George W. Pontius has been appointed manager of automotive engineering at the Bendix Products Div., the South Bend plant of the Bendix Aviation Corp.. The chief engineers of the several automotive product groups continue as before, but under the supervision of Mr. Pontius. These include: B. E. House, Chief Engineer Automotive Brakes; T. H. Thomas, Chief Engineer B-K and Hydrovac Vacuum Power Brakes; E. G. Struges, Chief Engineer Bendix-Weiss Universal Joint.

K-F & UAW Jointly Administer Employee Benefits

Another firm link in the chain of employe relations has been forged by the Kaiser-Frazer Corp. which has signed an agreement with Local 142, UAW-CIO establishing a union-management board of trustees which will administer a Social Security Fund providing company-financed insurance and hospitalization and surgical benefits for employes. The board announced that effective Oct. 1 approximately 11,000 members of Local 142 were automatically covered under a Social Security Program agreed upon in the K-F contract negotiated with the union last June.



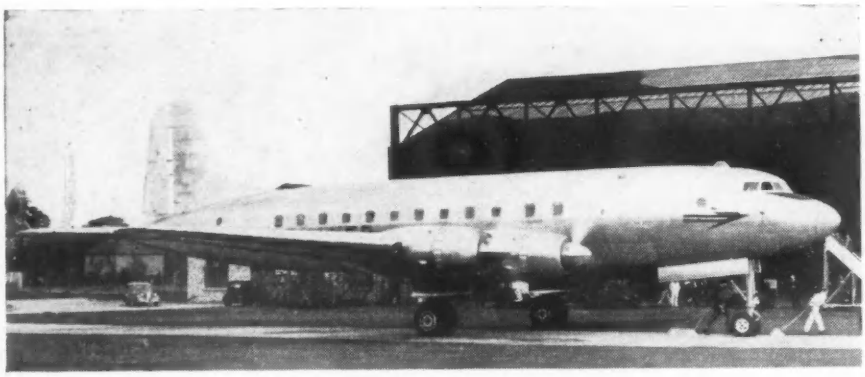
LILLIPUTIAN LAYOUT

Containing 3200 individual pieces, all made to the scale of one-fourth inch to the foot, this three-dimensional model layout was used by GM's Oldsmobile Div. in planning its new engine plant in Lansing, Mich., which is now in operation. The model is 12 ft long and 8 ft wide.

Ford Opens New Additions to Ypsilanti Parts Plant

Ford Motor Co.'s Parts and Equipment Manufacturing Div. has opened the new additions to its Ypsilanti, Mich., plant. This plant, the division's headquarters, manufactures generators, armatures, starters, cutouts, voltage

NEWS *of the* AUTOMOTIVE INDUSTRIES



HERMES THE FOURTH

Accommodating up to 63 passengers, Handley Page's new Hermes IV, reportedly Britain's first large civil transport to have a nosewheel undercarriage, recently made its first flight. Powered by four Bristol Hercules 763 engines, it has a wing span of 113 ft. and is 97 ft long.

regulators, and ignition coils. The new buildings, which include a one-story manufacturing unit and a two-story office building, together provide an increase of 145,500 sq ft of floor space, and an increase in manufacturing floor space of 82,000 sq ft.

Kelsey-Hayes to Take All of J & L McKeesport Plant

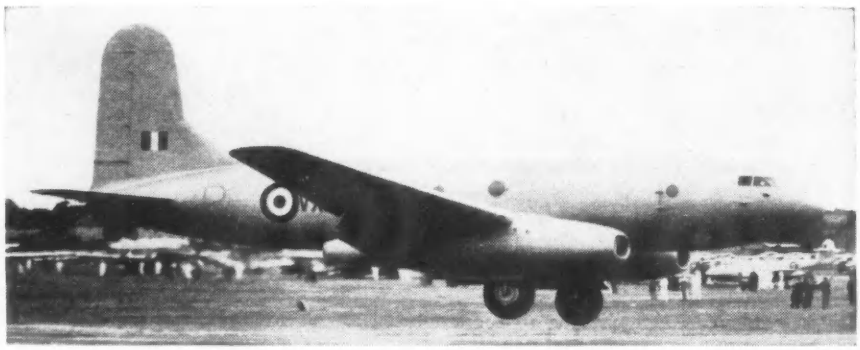
The Kelsey-Hayes Wheel Co., Detroit, will take over the entire McKeesport, Pa., works of the Jones & Laughlin Steel Corp. It was originally planned that Jones & Laughlin would retain part of the plant for building river barges and mine cars until July 1, 1949. However, it has been announced that the wheel company will occupy the whole plant immediately.

Goodyear Celebrates 50th Anniversary

The Goodyear Tire & Rubber Co. celebrated its 50th anniversary in Akron, Ohio, with a three-day program which began on Oct. 6.

Crosley Dividend is First for Any New Car Company

Crosley Motors, Inc. is the first automobile company organized since the war to pay dividends on its common stock. A dividend of 12.5 cents a share has been declared payable to stockholders of record Oct. 8. Up to Aug. 1, 1946, the company had a deficit of $151,200, but at the end of its fiscal year July 31, 1947, had a net income of $476,000. For the fiscal year ended last July 31, Crosley reported a net profit of $1,496,854, or more than three times the profit for the preceding year. Net sales for the 1948 fiscal year were in excess of $25 million, or more than double the preceding year's gross volume.



Acme

FOUR JETS FOR THE AVRO EIGHT

Described as the world's first jet-propelled airliner, the Avro Tudor Eight is an experimental airplane. It has a gross weight of 80,000 lb and is powered by four Rolls-Royce Nene engines. Its dimensions are wing span 120 ft; length 79 ft, 3 in; height 24 ft, and its maximum cruising speed at 25,000 ft is 350 mph.

Largest Car Show in South Held in Dallas

Including both domestic and foreign types, 29 automobiles were shown at the 1948 State Fair of Texas in Dallas, which opened Oct. 9 in the new $800,000 Automobile, Aviation and Recreation Building, in what was reportedly the largest automobile show ever held in the South.

Grumman Wins Guggenheim Medal for 1947

Leroy R. Grumman, chairman of the board, Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y., has been awarded the Daniel Guggenheim Memorial Medal for 1947. The award was bestowed by the Society of Automotive Engineers, the American Society of Mechanical Engineers, and the Institute of the Aeronautical Sciences at the National Aeronautic meeting of the SAE in Los Angeles. At this meeting Erold F. Pierce, manager of the Technical Data Div., and Harvey W. Welsh, assistant project engineer, Wright Aeronautical Corp., Wood-Ridge, N. J., were awarded the 1947 Manly Memorial Medal of the SAE.

Trico Buys Large Tract Near Buffalo

The Trico Products Corp., Buffalo, N. Y., has purchased a large tract of land in South Buffalo, N. Y., for the erection of a 30,000 sq ft addition to its No. 3 plant at that location.

Oltman Acquires Ownership Of Oltman-O'Neill Co.

Les Oltman has acquired sole ownership of the Oltman-O'Neill Body Co., builders of truck and delivery bodies. The company recently moved into its new plant in Centerline, Mich., suburb of Detroit, which has a capacity of 25,000 bodies a year.

NADA Policy Statement to Members & Car Makers

The National Automobile Dealers Association has mailed to its 33,000 members and to automobile manufacturing executives a general policy statement to promote more complete cooperation between the manufacturing and distributing branches of the automobile industry. At the same time, all members of NADA were requested in a letter by President Ben

NEWS *of the* AUTOMOTIVE INDUSTRIES

T. Wright to supply certain information on an attached confidential report form.

Luscombe Developing Airplane For Crop Spraying

To be known as the Silvaire Cropmaster, a new airplane is being developed by the Luscombe Airplane Corp. for aerial spraying. It is expected that the new plane will be ready for delivery next spring, and it is said to be based on the Observer design introduced early this year. It will be of all metal construction, powered by a 90-hp Continental engine.

Rise in Use of Electric Industrial Trucks

A new study by the Electric Industrial Truck Association reveals that 2.5 times as many storage battery-powered industrial trucks were bought by industry in 1947 as compared with average annual purchases in 1936-9. There are now 34 per cent more users of electric trucks than four years ago, and there was an increase of 26 per cent in the number of users of electric industrial trucks in 1948 as against 1944 in the automobile and automobile equipment industries.

Bell Aircraft Buys Schoenberger Co.

The Bell Aircraft Corp. has purchased the capital stock of the W. J. Schoenberger Co., Cleveland, manufacturer of valves and fittings used by the gas appliance and air-conditioning industries. The purchase price was not disclosed. The Schoenberger Co. will continue in business without change in personnel, management or nature of its work, and will be operated as a wholly-owned subsidiary of Bell.

Exhaust Valve Rotators Now Standard on Crosley

Crosley Motors Inc. is now using exhaust valve rotators in its engines as standard equipment. The company lays claim to being the first passenger car manufacturer to use rotators as standard equipment. However, they are used extensively in heavy duty truck engines.

Elect Ferguson Head of East Aircraft Makers Group

Malcolm P. Ferguson, president, Bendix Aviation Corp., has been elected Chairman of the East Coast Aircraft Manufacturers Council of the Aircraft Industries Association. J. S. McDonnell, president, McDonnell Aircraft Corp., was named Vice Chairman. Mr. Ferguson, formerly the Council's Vice Chairman, succeeds J. Carlton Ward, Jr., chairman of the board, Fairchild Engine and Airplane Corp., as Chairman of the Council.

Materials Handling Show in Philadelphia, Jan. 10-14

Expected to be one of the largest industrial expositions held in the U. S., the Third National Materials Handling Show, jointly sponsored by the ASME and the Material Handling Institute, will be held in Philadelphia, Jan. 10-14. A total of 96,725 sq ft of net exhibit space has already been leased by 192 companies.

Stanley Aviation Leases Space in Buffalo

The Stanley Aviation Corp. of Buffalo, N. Y., has leased about 5000 sq ft of plant space in that city. This company, founded recently by Robert M. Stanley, former Bell Aircraft vice-president, started operations with a Navy contract of close to $100,000.

Kaiser-Frazer Forms Dutch Assembly Plant

Expected to be completed and in operation by January, 1949, a new Kaiser-Frazer assembly plant in Holland, the Nederlandsche Kaiser-Frazer Fabrieken, N. V., has been formed in Rotterdam, for the assembly of Kaiser and Frazer automobiles in Europe. This plant will receive completely knocked down cars from K-F's Willow Run factory and will assemble them for sale abroad. It will have an initial capacity of 24 automobiles a day.

450 Commercial Vehicles in British Show

About 450 commercial vehicles of various types, with a total value of $4 million, were shown at the Commercial Motor Transport Show held recently in England. Featured in the Show was a passenger bus in which each seat was equipped with a radio to which a traveler might listen without disturbing other passengers.

French Base New Tax on Vehicle Horsepower

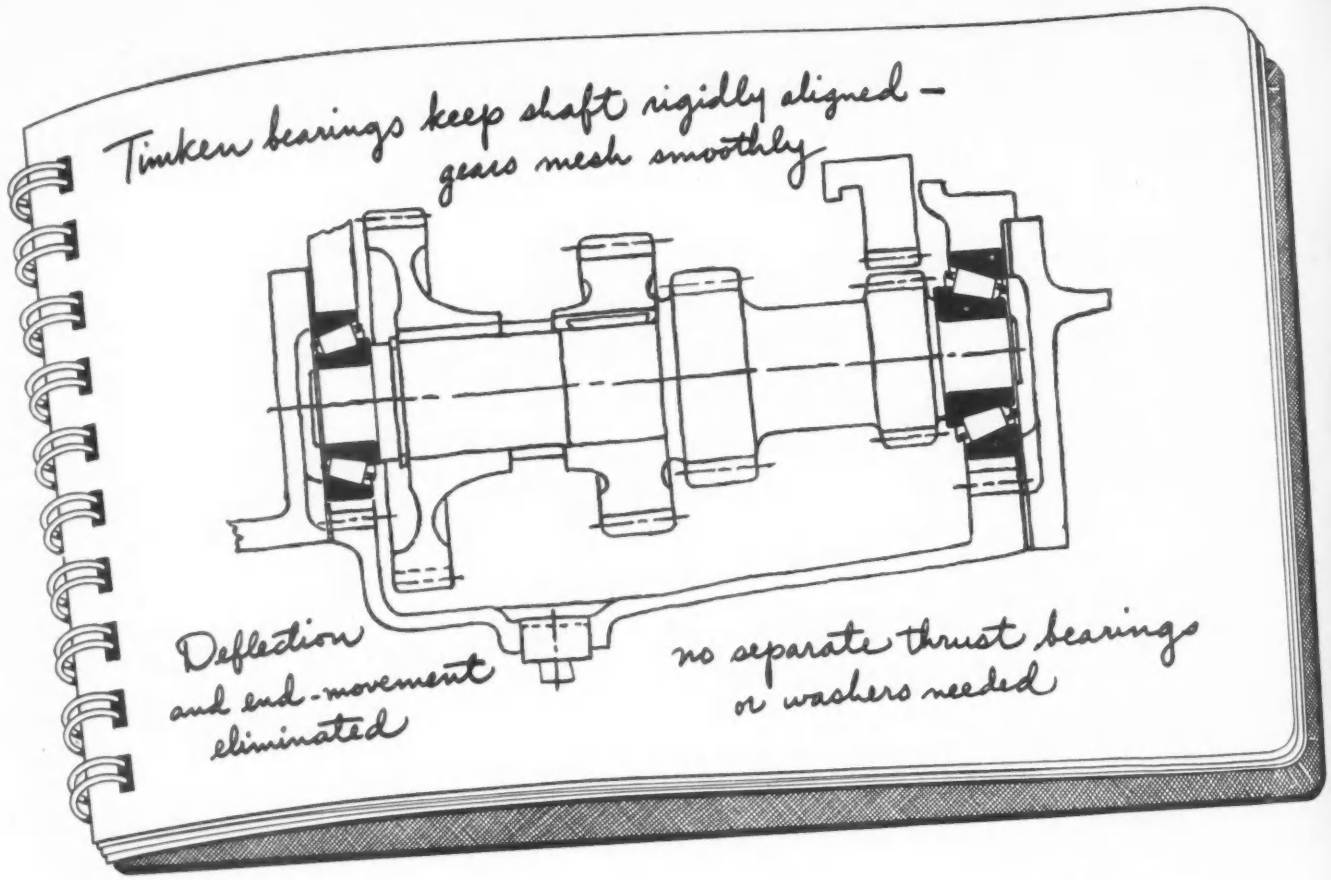
Breaking away from the principle that automobile taxation should be based on use and not on possession, the French government has just voted a special tax on passenger cars which varies from $1.70 a horsepower for low powered automobiles, up to $3.30 a horsepower for motor vehicles of more than 16 hp. For utility vehicles or automobiles used exclusively for professional purposes, the tax is reduced by half.

(*Turn to page 62, please*)

Acme

VISCOUNT THE FIRST

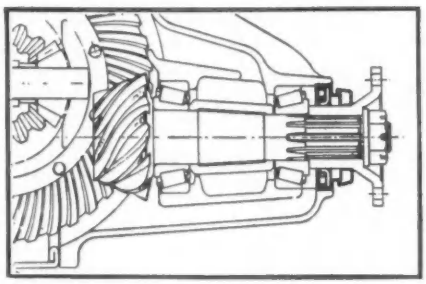
Four Rolls-Royce Dart gas turbine engines driving four-bladed Rotol propellers power this first prototype of a new English airliner, the Vickers Viscount, said to be the first civil transport plane to be powered exclusively by turbine-propellers. The plane has a cruising speed of 276 mph, can carry 32 passengers, and has a wing span of 89 ft., and is 74.5 ft long


Timken bearings keep shaft rigidly aligned — gears mesh smoothly
Deflection and end-movement eliminated
no separate thrust bearings or washers needed

How to get smoother meshing in automatic transmissions

SMOOTH, accurate meshing with quiet operation of the gears demands a rigidly aligned countershaft, free from deflection or end-movement. That's where Timken tapered roller bearings can help, by keeping the countershaft in your new automatic transmission accurately positioned for years of trouble-free service.

Due to their tapered design, Timken bearings carry both radial and thrust loads in any combination—an important consideration with helical gears. Separate thrust bearings or washers are unnecessary. The tremendously high load-carrying capacity of Timken roller bearings also means that minimum sized bearings can be used, conserving space. And since the bearings can be adjusted permanently at installation, wider tolerances on surrounding parts can be allowed, with consequent production savings.



LOOK AT PINIONS FOR EXAMPLE . . . Pinion bearings in hypoid gear rear axles, where particularly heavy thrust and radial loads are involved, are among the many applications where Timken bearings have proved their outstanding superiority. Wheels, steering, double-reduction truck axles, are other examples.

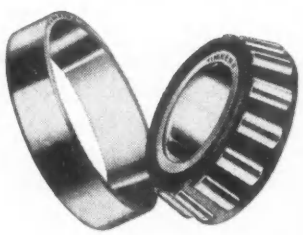
Wherever wheels and shafts turn, Timken bearings can be depended upon to take the toughest loads, giving smooth, trouble-free operation that normally lasts the life of the machine. Feel free to call on our engineering facilities for help and information. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, O. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company...because our vast manufacturing facilities are widely dispersed . . . you will find the Timken Company a supply source of outstanding reliability.*

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←

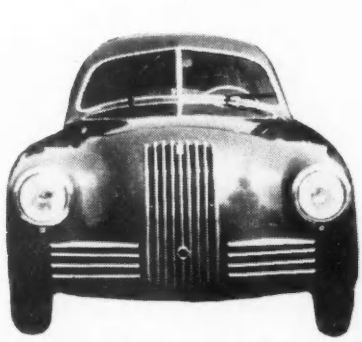
Italy's First Salon

Italy's 1948 International Automobile Salon, First Since the 1937 Event at Milan and Since 1913 at Turin, Proved to Be a Dramatic Demonstration of the Italian Automobile Industry's Recovery from the Ravages of War. Held Last Month at the Newly-Built Valentino Palace in Turin (see above photo), the Show Was the Thirty-First of the Series in That Country and Featured the Latest Italian Styling.

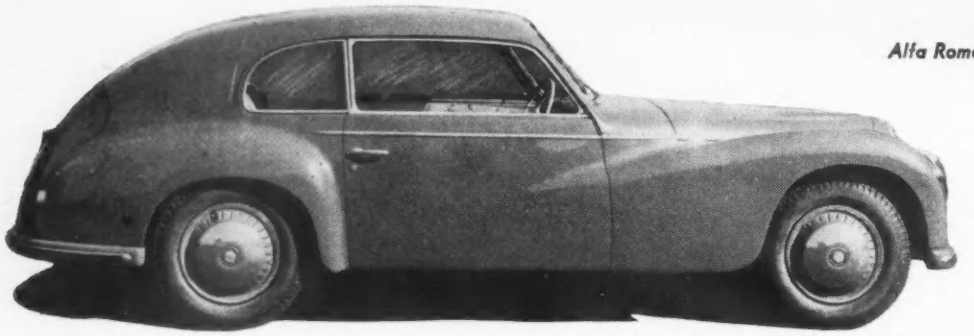
By W. F. Bradley
Special European Correspondent for
AUTOMOTIVE INDUSTRIES

TURIN—For the first time in 11 years, Italy in September staged in this city an automobile show which is not only a display of the country's products, but a demonstration of the vitality of the nation in recovering from the wreckage of war. Most of the factories had to be rebuilt, and in addition the Valentino Palace, in Turin, had to be specially erected, as no hall suitable for a show was available. Work on the Palace was completed in 10 months, and when the President of the Republic opened the show, the 275 exhibitors had 129,172 sq ft of space available in a building with marble floors and stone columns under the biggest roof span in Europe. Three American firms occupied booths—Studebaker, Kaiser-Frazer, and Willys Overland.

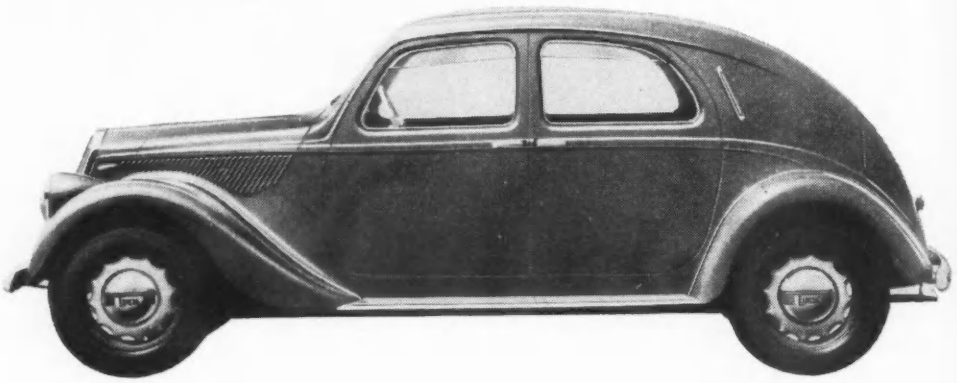
Technical novelty is provided by the smaller manufacturers, and particularly by the private body builders. The big firms were satisfied to get into production on their prewar, or modified prewar models; the entirely new types will not be on the production lines until 1949 at the earliest. At the last Paris show Isotta-Fraschini showed a V-eight, rear mounted job, with the powerplant mounted in a platform chassis (see page 29, Dec. 1, 1947, issue of AI). No deliveries have yet been made, but it is claimed that the first cars will be ready in the spring. Among the changes which have been decided on is a reduction of the piston displace-



Fiat standard sports model

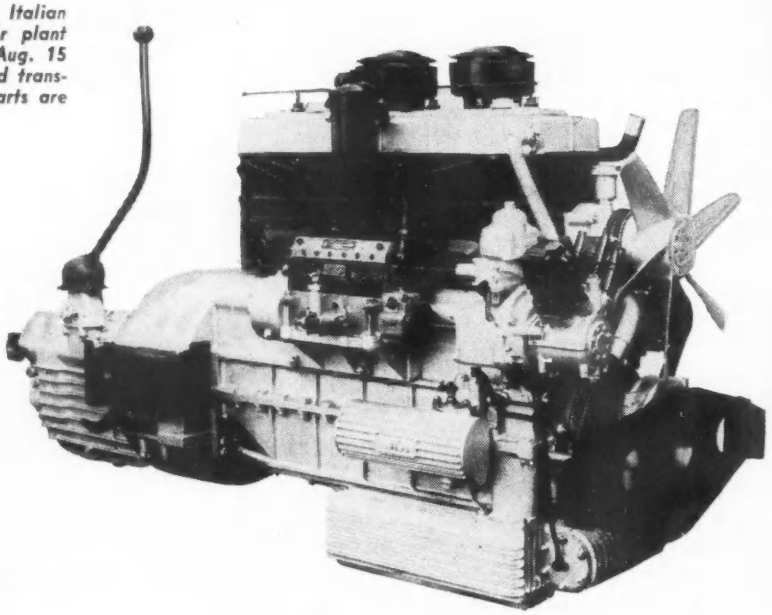


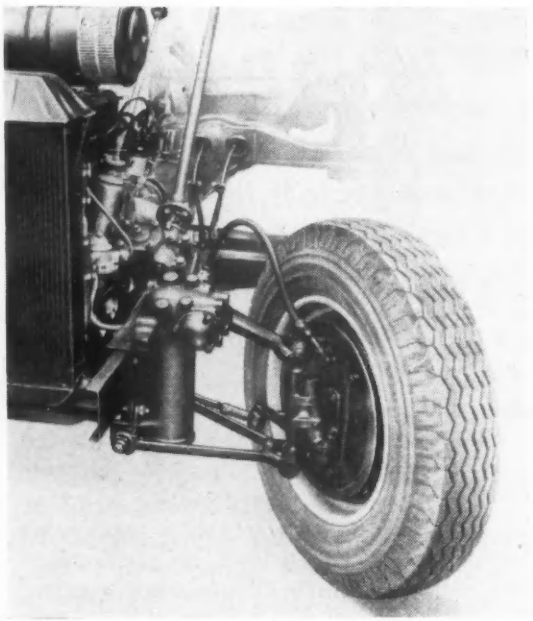
Alfa Romeo with its standard body.

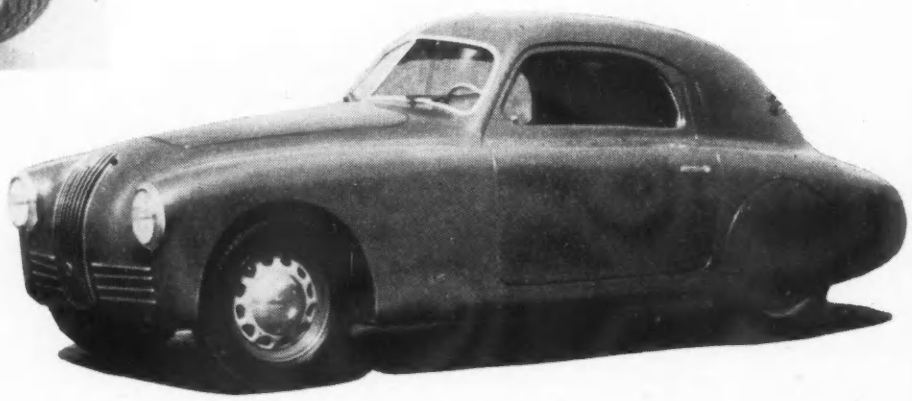


(Right) This Lancia model features unit construction of body and chassis, 91 cu in. V-4 engine, and independent suspension of all wheels.

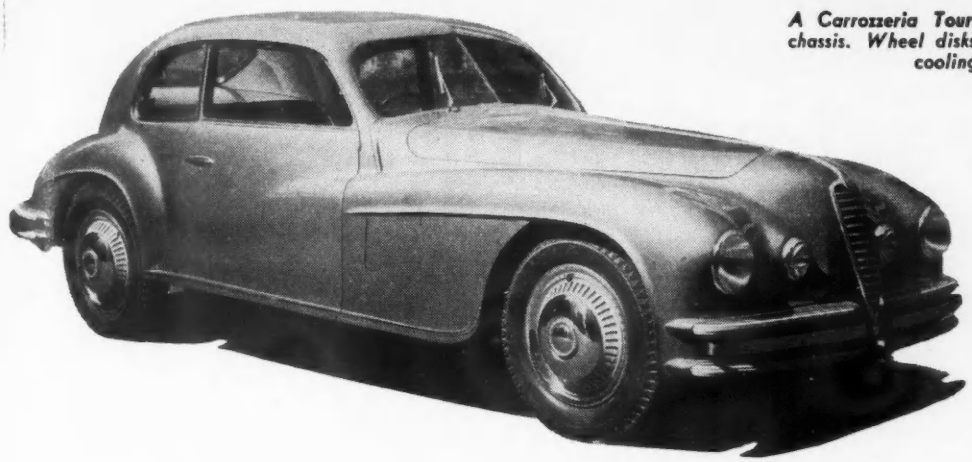
(Right) Typical of Diesel engines powering Italian trucks is this Lancia six-cylinder 122 hp power plant on the new Lancia 864 truck (see page 41, Aug. 15 issue of AI). Its crankcase, oil sump, clutch and transmission housings, fan, valve cover and other parts are aluminum alloy.







Standard Fiat coupe of 110-in. wheelbase, powered by 91.5 cu in. engine. Inset (above) shows construction of its independent front wheel suspension.



A Carrozzeria Touring body on an Alfa Romeo chassis. Wheel disks are made with slots to assist cooling of brake drums.

ment to 183 cu in. Caproni also uncovered a new front drive model at Paris, with a flat-four engine in a platform chassis. A complete car is on view at Turin, but delivery date is set for early 1949.

Fiat, the biggest Italian manufacturer, has three passenger car models in full production, all of them being modifications of the prewar models. About 12 years ago Fiat put on the market the "500" a small two-seater with a four-cylinder engine of only 34.7 cu in. (see page 35, Sept. 1, issue of AI and page 34 of this issue). This met with tremendous success, not only in Italy, where gasoline costs are the highest in the world, but throughout Europe. It has now been revamped, with valves in the aluminum head and a compression ratio of 6.4 to 1, with the result that the power output has been increased to 16.5 at 4400 rpm. The fuel tank is still under the cowl, but feed is by pump. Quarter elliptic springs have given way to semi elliptics, with hydraulic shock absorbers all round and a transverse stabilizer at the rear. The front end independent suspension has been changed only in detail. The little car now has a maximum speed of 64 to 65 mph and possesses remarkable road holding ability. A new model is a station wagon body on the same chassis with a lower reduction rear axle.

Second in importance is a four-cylinder overhead valve engine of 67 cu in. This has undergone fewer changes. A modification of this type is a sports model, with the engine developing better than 40 hp at 5500 rpm. With a Fiat streamlined closed body it is popular as a sport's car and has been successful in long distance road races. The third model is a six-cylinder of 91½ cu in. Incidentally, not more than five per cent of the Italian production exceeds this piston displacement.

Lancia has two passenger car models, both with four-cylinder narrow V type engines, of 55 cu in. and 91 cu in. Respective outputs are 28 and 48 hp. Unit

(*Turn to page* 70, *please*)

(Above) Isotta Fraschini luxury cabriolet with its 120-hp engine at the rear. Price of this car is about $7000. (Acme photo)

(Left) Ferrari four-passenger car. The body was designed by Carrozzeria Touring firm.

A Practical Approach to

In the application of torsion bar suspension to racing cars, the important factors to be considered are: extreme shock loads; simplicity for ease of maintenance; weight of component parts, always a prime factor in racing cars; and limited area for installation of units required.

On the front installation, a conventional tubular axle is used. The torsion bars are placed parallel and underneath the tubular frame. The anchored ends of the torsion bars pass through a split clamp bracket that is locked with a bolt, then a short lever arm with set screw is attached to the bar for adjustment. A standard SAE serration is used to attach the connecting arm and the adjusting arm to the torsion bar.

Torsion Bar Data

Torsion Bar Diam.....	0.562 in. nom
Effective Torsion Length—Rear	24 in.
Effective Torsion Length—Front	22.5 in.
Effective Arm Length—Rear	8.0 in.
Effective Arm Length—Front	7.5 in.
Static Deflection—Rear.....	4.0 in.
Static Deflection—Front....	3.37 in.
Deflection Rate—Rear	10 lb per deg
Deflection Rate—Front	9.2 lb per deg
Stress, at 289 lb Static Load	60,000 psi
Total Windup Angle	52.5 deg
Torque Rate	5000 lb in. per radian
Present	15 deg

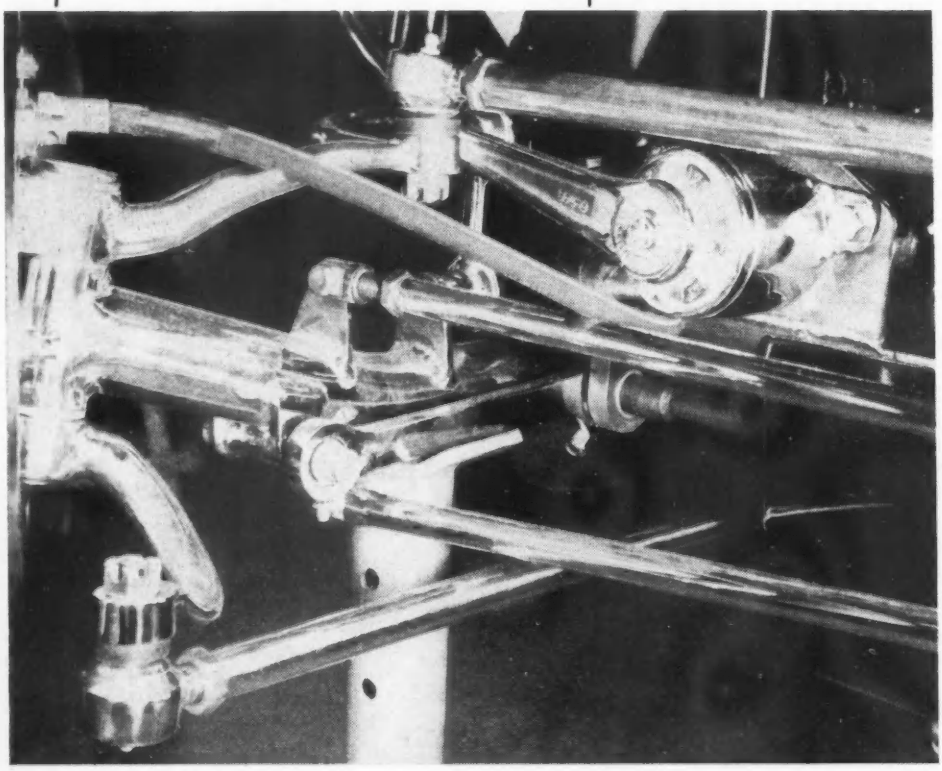
The torsion bar itself is bar stock of nominal diameter with the hub ends upset, straightened, ends turned and serrated, heat treated, shot peened and finally straightened. After straightening and before presetting, the bar is coated in a hot alkaloid oxide bath.

The 46 in. maximum tread of midget racing cars is a factor in determining the effective arm and bar length. The method of mounting bars to the frame limits the arm length to 7.5 in. at the front and 8.0 in. at the rear. The bar length is governed by the offset of the frame and comes to 22.5 in. effective torsional length on the front and 24 in. on the rear. As to movement, the front clearance for full jounce is 2.5 in.; due to structural limitations, the rear is limited to 3.5 in. full jounce.

Originally a torsion bar was used that had a large safety factor, the assumption being that the spring quality of the bar would take care of itself, so it should be large in diameter (0.68 in.-0.75 in.) to assure long life. The resulting spring was, of course, unsatisfactory and this led to a period of experimenting and testing under actual working conditions. The result of this is the present spring.

The bar now being used is made from 0.56 in. nominal diam SAE 1095 bar stock; the ends are upset and machined to 0.812 in. diam for a bearing or clamp surface and the extreme ends of the bar are then machined to a standard SAE 0.75 in.-48 serration to which the lever arm and the adjusting arm are attached.

To gain full freedom of spring action and to avoid too much weight shifting without any extra side thrust, a shackle is used on the right side only. The connecting arm on the left side is used as an anti-side-thrust link, this method being used on both front



This photo shows the position of the torsion bar and arm on the front left side of the car. The torsion bar fittings are welded to the frame side members. The arm is parallel to the axle.

Torsion Bar Spring Design

What a Racing Car Builder Has Learned

By Frank Kurtis and Avard Ward,
Kurtis-Kraft, Inc.

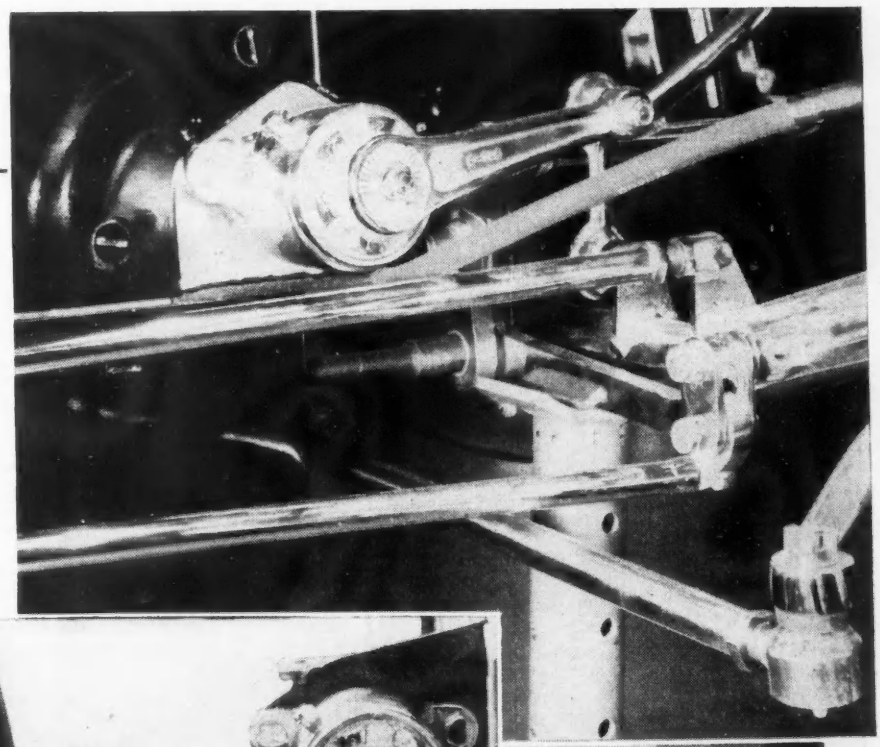
and rear. Midget racing cars, while on the track, turn in one direction, counter-lockwise, so that the resulting side thrust is in one direction only.

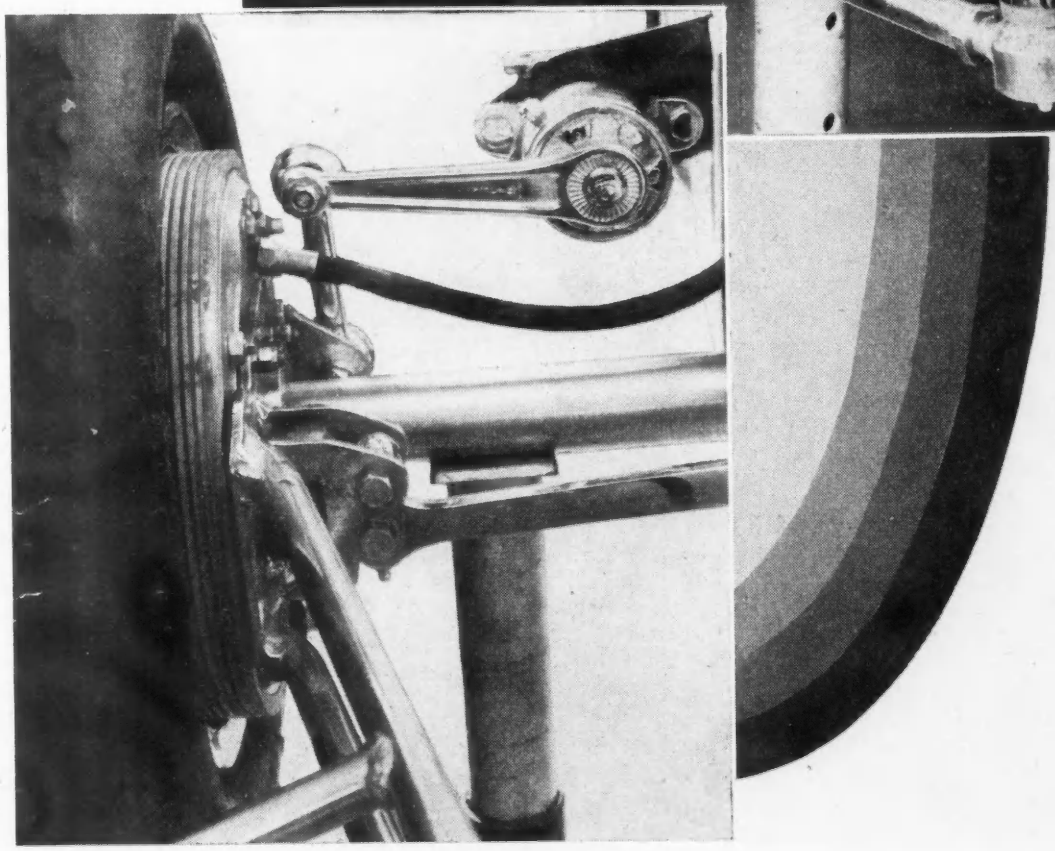
In calculating the bar diameter originally, it was found that approximately 0.425 in. would be the nominal diam, but in actual loading tests on a stationary test stand, this size deflected too much at static load-

(*Turn to page 86, please*)

Factors Determining Torsion Bar Design

Component	Weight lb.
Car	802
Fuel, 12 gal.	94
Water	16
Oil	20
Driver, average	180
Total laden weight	1112
Load each rear bar	289
Load each front bar	267
	Per Cent
Percentage load on rear tires	52
Percentage load on front tires	48





Here is shown the torsion bar and arm assembled to the front right side of car. Except for the shackle, the mounting is similar to that on the left side.

For rear mounting the fitting for the arm shackle is welded to the rear radius rod axle fitting.

A New and Well-Equipped

By Joseph Geschelin

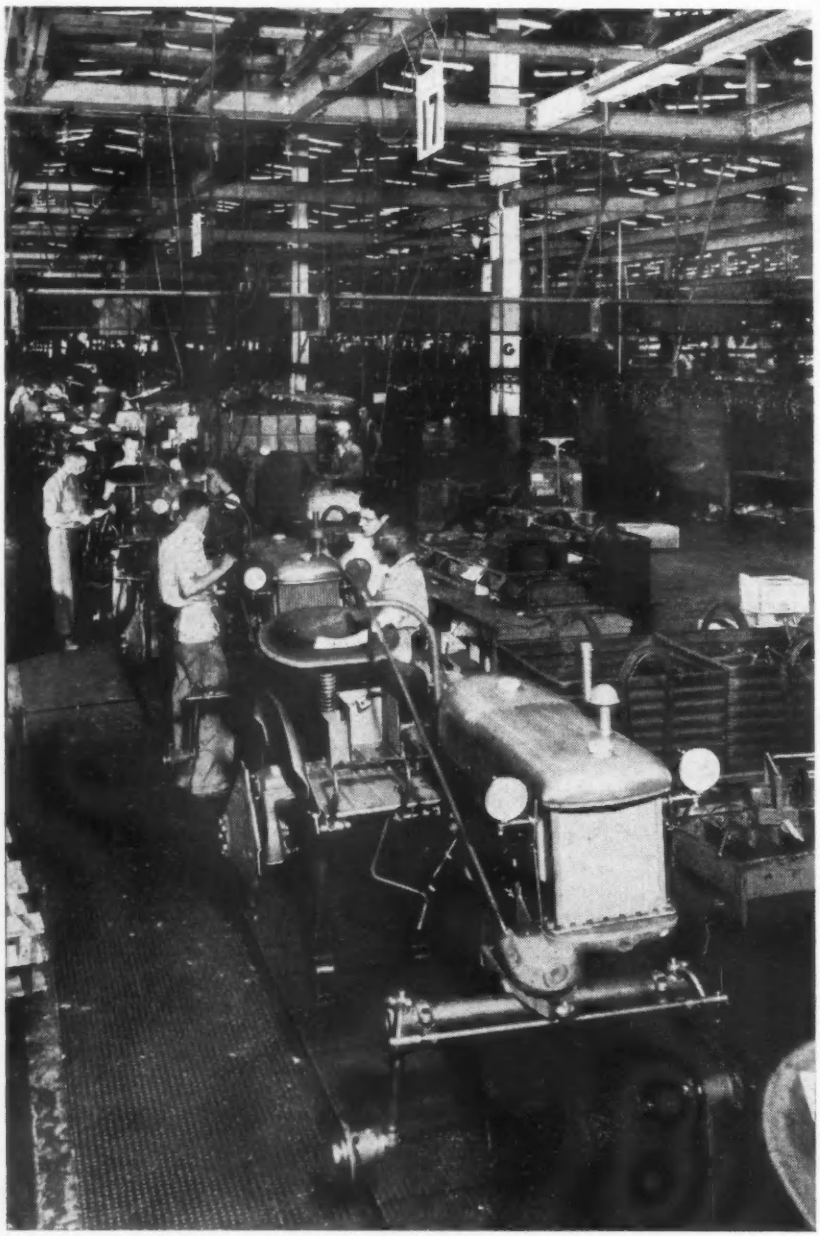
STRICTLY a mass production plant for building the largest volume of tractors in the line, the International Harvester tractor works in Louisville, Ky., is fortunate in settling in a plant that served as one of the great military airplane manufacturing facilities in the past war. The vast expanse of clear floor space and high overhead clearance contribute to good seeing and comfortable working conditions, and afford ample balcony areas for housing nonproductive activities out of the way of the production floor to facilitate handling.

Unquestionably IHC set out to make this the most modern and best integrated plant that production brains could visualize. At the present writing the plant is responsible for making the well-known Farmall Cub as well as the "Super A" and the Model C series tractors. As things shape up this plant is almost completely self-contained and self sufficient. A large modern foundry now under construction will produce all the gray iron castings needed at the Louisville works.

Starting from scratch the management was able to develop a floor plan most favorable to economic straight line methods, and has provided the most modern equipment available today. An outstanding feature is the induction hardening department—principally for transmission gears—which is said to be one of the largest installations of electronic hardening equipment to be found in the country.

To acquire some impression of the nature of plant facilities, consider that the plant boasts the following departments: machine shop, press shop, welding, automatic screw machines, gear making, forge shop, heat treating, induction hardening, engine assembly, tractor assembly, paint shop, dynamometer building, and a shipping building.

The entire scheme is unified and integrated by means of an extensive system of overhead conveyors linking various departments with the final assembly lines, eliminating costly and time-consuming handling of materials, and serving to establish smooth and regular delivery of parts and sub-assemblies to the final assembly lines. In addition to the monorail system there is an engine assembly conveyor line, and two



Looking down one of the two tractor final assembly lines at the Louisville works.

Tractor Plant

Transfer Machines and Other Specialized Equipment as Well as Straight Line Production Methods Are Employed at International Harvester's Louisville Works

mechanized floor conveyors for final tractor assembly.

Since this operation just by virtue of size and scope defies description in a single article, we have selected a sampling of activity as being indicative of its modernity. For this purpose major emphasis will be given to some of the automatic transfer machines, and the press forging technique for making crankshafts.

The forge shop, organized exclusively for press and upsetter forging, features an immense National Maxipress tooled for flywheels, Ajax vertical forging presses, Ajax upsetters, and a number of Bliss trimming and Cleveland coining presses. Crankshafts are made by press forging in a compact and fast moving sequence. The billet, 2½-in. RCS steel about 25 in. long, is sheared to length in a No. 12 Buffalo shear. As another example of advanced practice, these big billets are heated to forging temperature in a Budd electronic induction heating unit, four of these being installed to serve the line. Billets are heated to a temperature ranging from 2275-2300 F.

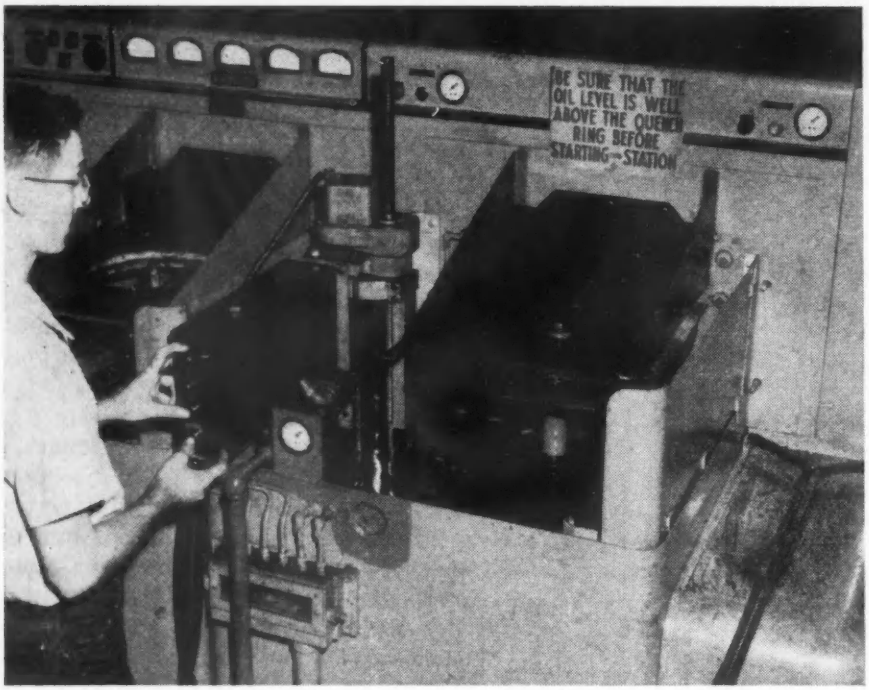
As soon as the indicator on the induction heater shows that forging temperature has been reached, the billet is withdrawn and presented to a 2500-ton Ajax forging press having three die stations—break-down, and two forming

TABLE 1

Barnes Eight-Station Transfer Machine

Station	Operation
1	Unit 30—drill four holes
	Unit 31—drill six holes
2	Unit 30—ream two holes, drill seven holes
	Unit 31—ream two, drill 10, and drill idler shaft hole through three walls
3	Unit 30—finish ream four holes
	Unit 31—finish ream and counterbore two holes
4	Unit 32—drill three holes
5	Unit 32—bore, tap and counterbore large diameter, drill and countersink another hole, ream two holes, drill 17 holes
	Unit 33—drill two holes
6	Unit 34—tap one hole
	Unit 33—finish ream one hole
7	Unit 35—spotface two inside idler bosses
8	Unit 36—tap seven holes
	Unit 37—tap 10 holes
	Unit 38—tap 18 holes

End station of the big W. F. & John Barnes transfer machine for drilling and reaming the large end frame. Frames have been prepared for this operation in the battery of Ingersoll transfer mills immediately preceding this station.



This is one of the six-station Tocco induction hardening machines found in the extensive induction hardening department. Each of the work stations is fitted with power driven heads for rotating the work, and includes its own quenching tank.

cavities. The forging then goes to the adjacent No. 56½ Bliss press for trimming. Then while the forging still retains its heat, it is moved to the 4-in. Ajax upsetter for forming the flange at the flywheel end. Following inspection the forging is given a normalizing treatment and then a restrike in a 1000-ton Cleveland press.

Forgings are cleaned in an American Wheelabrator, inspected for hardness and made ready for transport to the crankshaft machine line. It is also noteworthy that the crankshaft is given Magnaflux inspection twice, the second check being made at the end of the machine shop operation.

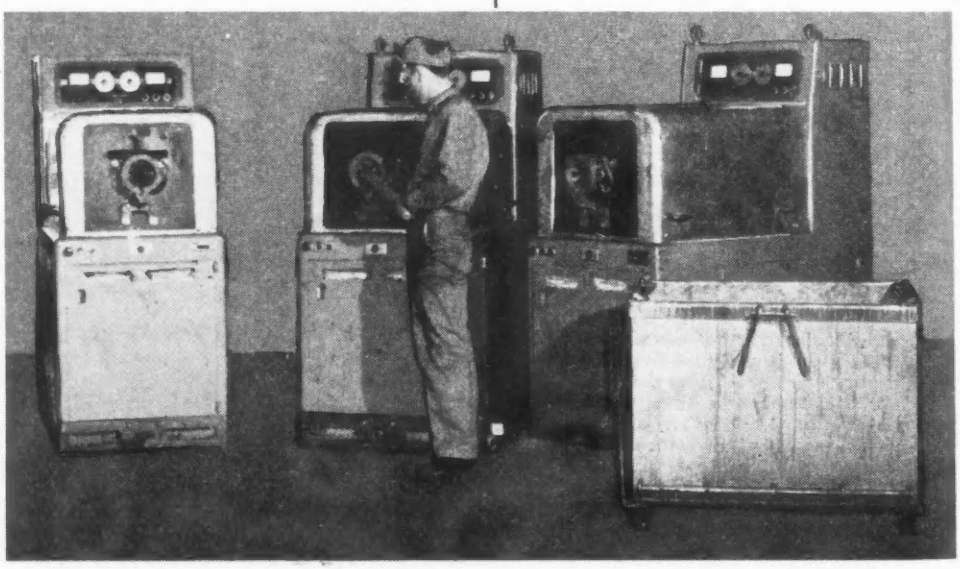
The rear frame, usually the largest casting in a tractor, is machined along a compact straight line featuring a number of transfer machines of advanced type. First there is a group of two special Ingersoll milling machines, the first of which rough- and finish-mills two sides. This machine has two eight-in. cutters, two 10-in. cutters, and two 18-in.

(*Turn to page* 92, *please*)

TABLE 2

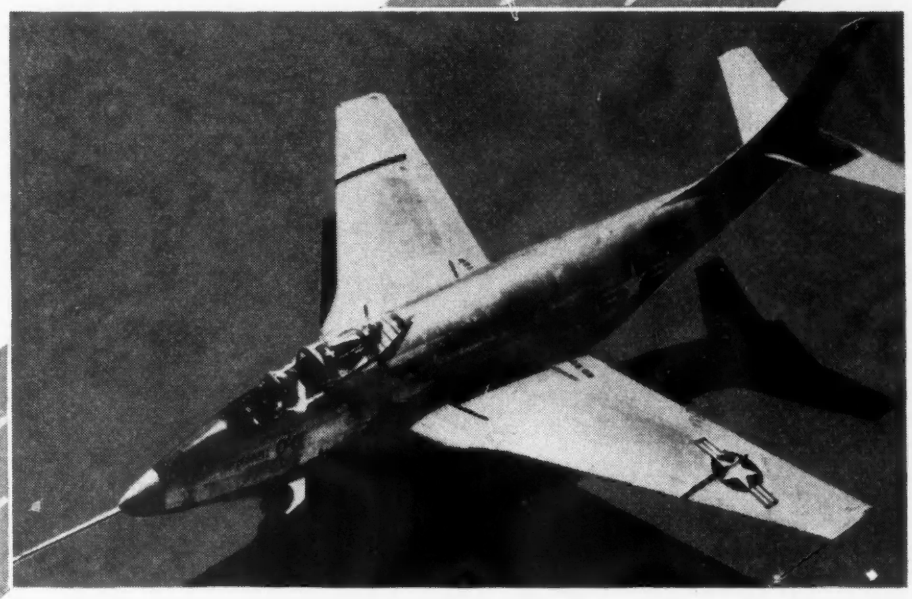
Natco Holeway Transfer Machine

Station	Operation
1	Load
2—Vertical head	Drill 16 holes
3—Vertical head	Chamfer 16 holes
4	Idle
5	Idle
6—L.H. head	Drill 15 holes
R.H. head	Drill 19 holes
7—L.H. head	Drill eight holes, rough mill and semi-finish cored hole, core drill one hole
R.H. head	Drill five holes, rough ream one, core drill two holes
8	Idle
9	Idle
10—L.H. head	Drill two holes, chamfer one hole, back chamfer one hole
R.H. head	Spotface one boss, chamfer 14 holes, drill two holes, counterbore, face bore and chamfer one hole
11—L.H. head	Chamfer 11 holes
R.H. head	Rough and semi-finish ream one hole, drill two holes, ream one hole, core drill three holes
12	Unload



Here is the battery of Budd electronic induction heating machines which serve the Ajax crankshaft forging press — out of view at the left. The large square billets required for the operation are automatically heated to forging temperature.

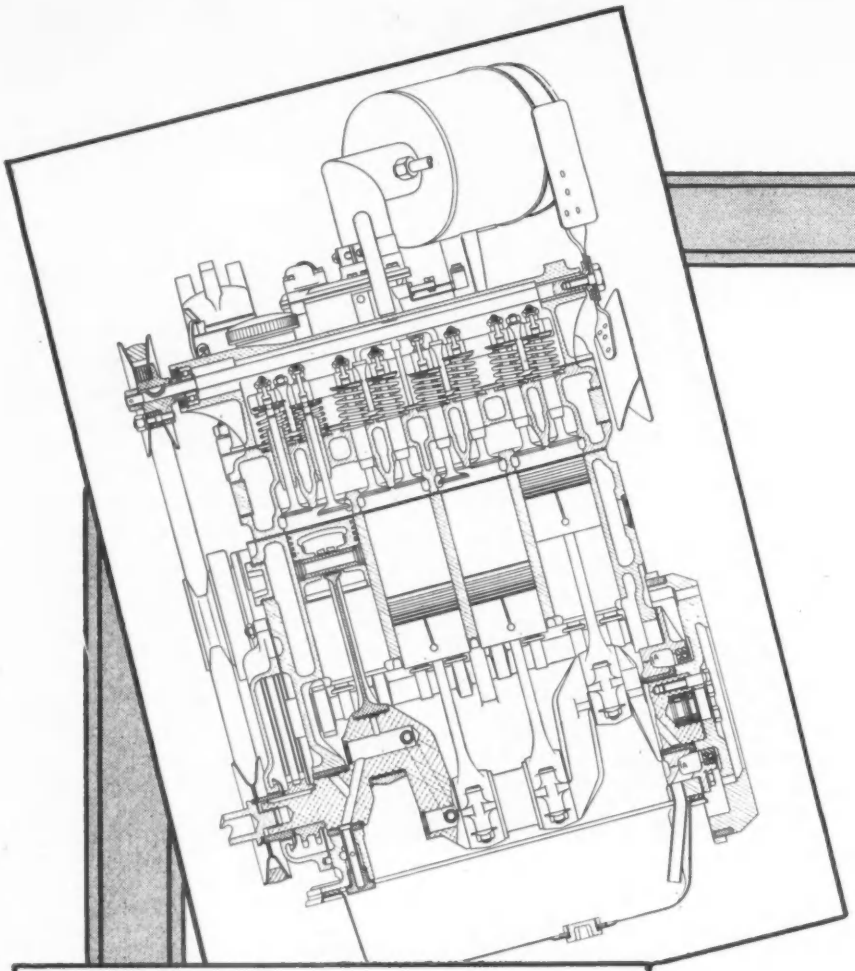
AF Experimental Planes



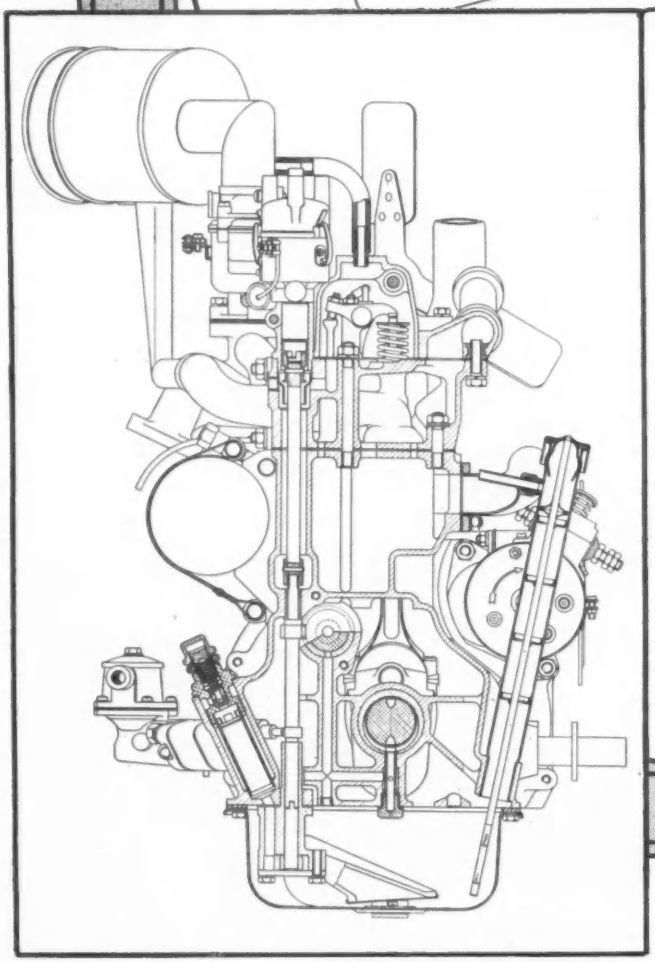
Recently revealed by the U. S. Air Force this McDonnell twin-jet XF-88 has been designed as a penetration fighter, capable of operating deep inside enemy territory as either a fighter-bomber or bomber escort. It has a gross weight of 15,000 lb, is 55 ft long, 15 ft high, and has a wing span of 40 ft. (U. S. Air Force photo from Acme)

Described as a tiny sonic zone flying laboratory, Northrop's X-4 is being readied for engine and taxi tests at Hawthorne, Calif., according to the U. S. Air Force. Powered by gas turbines, the X-4 employs elevons in the trailing edge of the wings to provide both aileron and elevator action. It has a wing span of about 25 ft, is about 20 ft long, is approximately 15 ft from vertical fin tip to the ground, and has a design gross weight of about 7000 lb.

This is the first photograph of the Northrop XF-89, a new U. S. Air Force experimental, all - weather, twin-jet fighter, which is now being intensively flight tested at Muroc Air Force Base, Calif. Equipped with "X-ray eyes" for penetrating darkness, storm or fog, the XF-89 has a wing span of about 50 ft, is about 50 ft long, and 15 ft high. Its design gross weight is over 30,000 lb. The plane's speed, range, and ceiling are restricted.



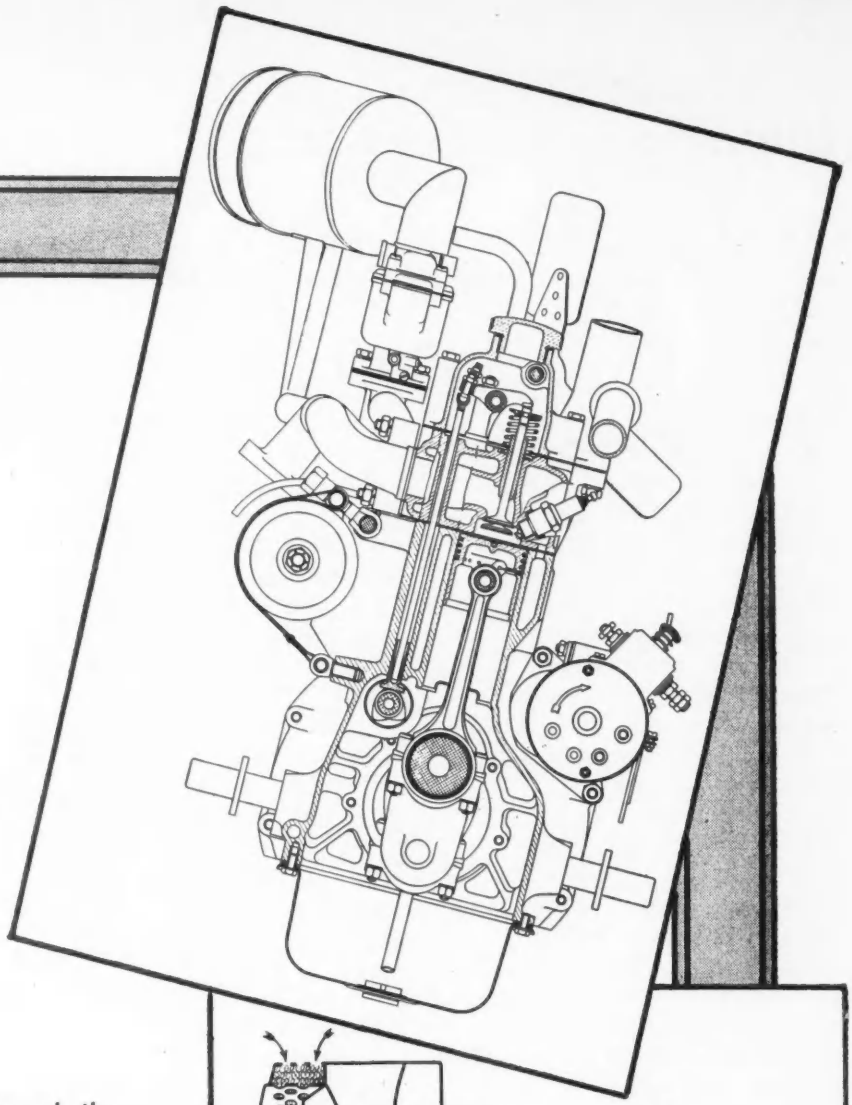
Fiat's Latest Economy Engine



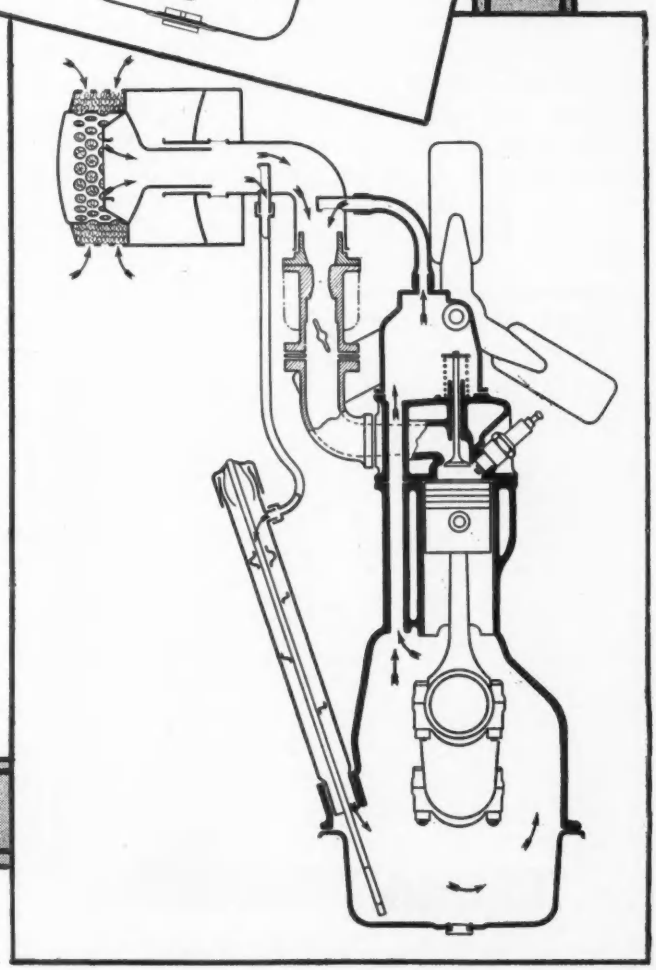
(Upper left)—Longitudinal section of the engine as viewed from the left side. Note that the fan, located at the rear of the engine, is driven by a shaft which passes through the cylinder head cover.

(Left)—Transverse section just forward of the first cylinder, looking rearward. The fuel pump is driven off the distributor shaft. An improved oil filter with a pressure regulating valve incorporated in the filter plug, and accessible from the outside, is shown mounted at the lower right side of the engine.

HERE are sectional drawings of the latest four-cylinder, overhead valve, 2.05 in. bore by 2.64 in. stroke engine that now powers the new Fiat 500B car. Other details of this new Fiat car were presented in the Sept. 1 issue of AUTOMOTIVE INDUSTRIES, page 35.



(Upper right)—Transverse section through the first cylinder. The oil filler opening is located in the valve cover.



(Right)—This view shows how the crankcase is ventilated by filtered air that circulates through the effect of a difference in pressure due to the arrangement of the connections on the inlet manifold. In this diagrammatic drawing the dip stick tube is shown on the opposite side of the engine to simplify illustrating the connection between it and the air intake.

Important Factors in

Designing Camshaft

THE design of a timing chain and sprocket drive for automobile engine camshaft is established by satisfying the demands of the following factors: center distance between crankshaft and camshaft, available space, magnitude and character of camshaft torque, maximum operating speed, type of lubrication, magnitude of crankshaft bending and torsional vibration, natural frequency of the timing chain, crankcase ventilation, and manufacturing problems. These factors will be treated as individual topics for the sake of clarity and simplicity. A satisfactory design will of necessity be a compromise of the optimum solution to each factor.

Center Distance of Drive

The dimension between the center lines of the sprockets is defined to be the center distance of the drive. This dimension is controlled by the location of the camshaft in relation to the crankshaft; however, any arbitrary distance is not acceptable. The approximate center distance of the drive may be dictated by the engine design, but the exact dimension must be established to satisfy the center distance of a particular sprocket and chain combination. Most drives use a chain made up of an even number of links.

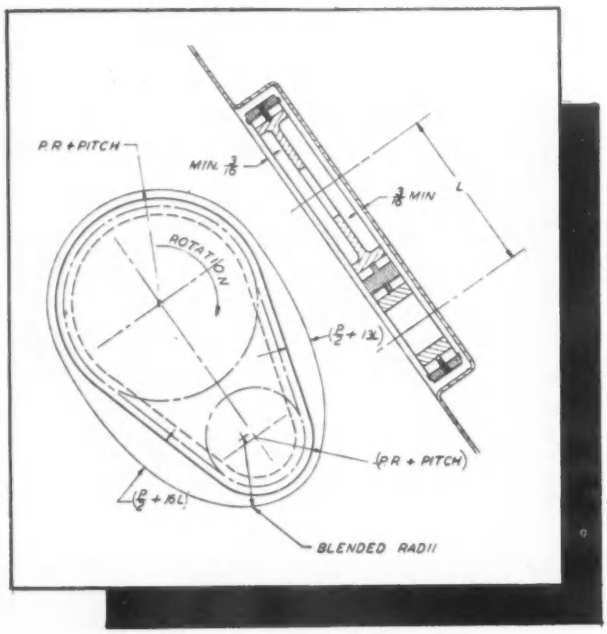


Fig. 1—General proportions of cover.

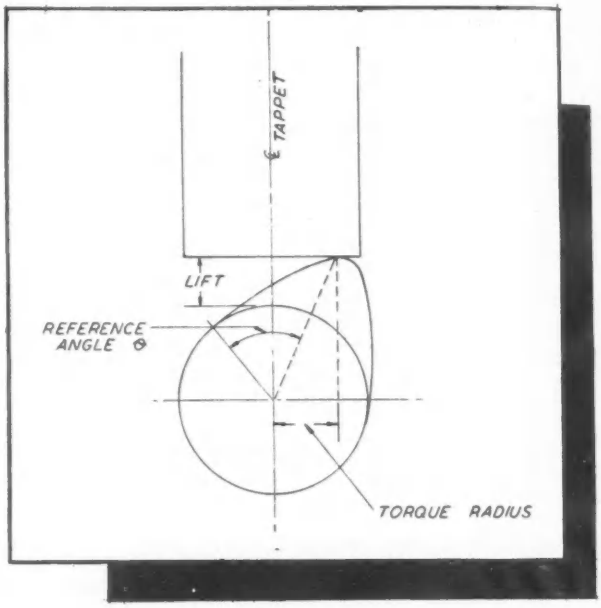


Fig. 2—Method of determining torque radius.

Odd numbers may be used, in which case special offset link sections are required, which add to cost. The number of teeth in the crankshaft sprocket is also an important item of consideration in the establishment of the exact center distance. The minimum number of teeth for the crankshaft sprocket is determined somewhat by the pitch of the chain. It is preferable that this sprocket have at least 19 teeth where ½ P is used and 21 in the case of ⅜ P. This recommendation is made to keep the joint articulation to a minimum, which results in longer chain life and quieter operation of the drive. The choice of the proper pitch to use for a specific application involves other consideration than that of center distance. These conditions are treated in another part of the text. Thus the selection of the number of links and crankshaft sprocket teeth may be made by observing the following rules: the chain should have an even number of links if possible; the crankshaft sprocket should have 19 or more teeth.

Space Requirements

It is generally desirable to keep the size and weight of the moving parts of an engine to a minimum. These factors curtail the size sprockets that can be used, because for each tooth added to the crankshaft sprocket two must be added to the camshaft sprocket thus in-

Chain Drives

By Earl F. Riopelle,
Assistant Chief Engineer,
Morse Chain Company

creasing the size and weight of the drive. This is one consideration that makes a ⅜ pitch chain more desirable because it has more teeth per sprocket than a ½ pitch sprocket of the same diameter.

The camshaft drive cover must be so proportioned that adequate clearance is provided between the outside of the chain and the inside of the case. Fig. 1 gives the general proportions of a well designed cover. The dimensions shown provide the acceptable minimum clearances. If it is possible, slightly more clearance is desirable. The clearance provided over the width of the chain is also important. In connection with this it is emphasized that the sprockets must operate in the same plane to avoid abnormal wear of the chain guide links.

Magnitude and Character of Camshaft Torque

When the general dimensions of the drive are established it is necessary to determine the load that the chain will have to carry. In most conventional engines the total torque on the camshaft drive consists of that required to lift the valves and drive the oil pump, fuel pump, and distributor or other accessories. The greatest and most difficult load to determine exactly is that which is required to lift the valves. The torque required to drive the accessories can be determined experimentally by a test set up for each unit, but to do this for the valve load is very difficult, because the mean or average torque is of little interest. It is necessary to know how the torque of the camshaft varies in one revolution in order to determine the proper width of chain to use. It is quite possible that a particular cam contour may give a low average torque, but have high peak loads which would subject the chain to high impact loads.

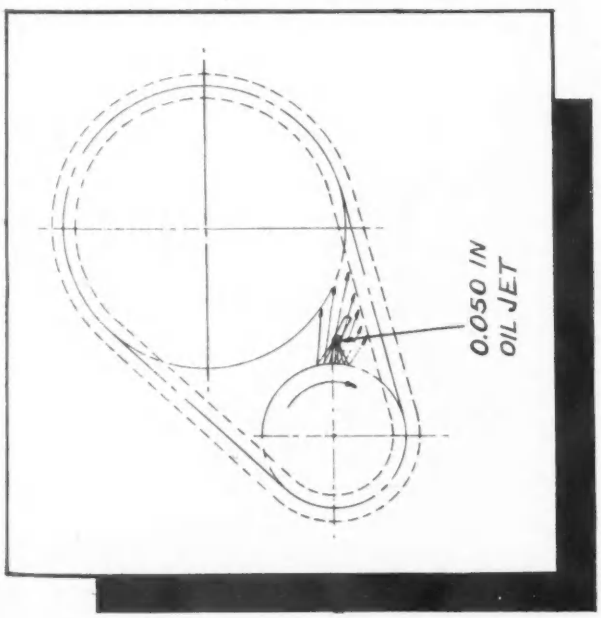


Fig. 3—Best arrangement for lubrication of timing chain.

The method outlined in the following will give the load on the timing chain more accurately than if the chain were selected by an estimate based on the size of the engine. The friction of the system is not taken into account by this method. However, this is not a serious omission because experience has shown that the results are reliable in relative load predictions for camshafts of different contours.

The load calculation is simply that of determining the sum of the spring and inertia loads of the valve and tappet and multiplying that load by the radius on which it is acting.

In order to do this the following information is needed:

1. Number of cylinders in engine.
2. Drawing of the cam contour.
3. Lift and acceleration diagram of cam.

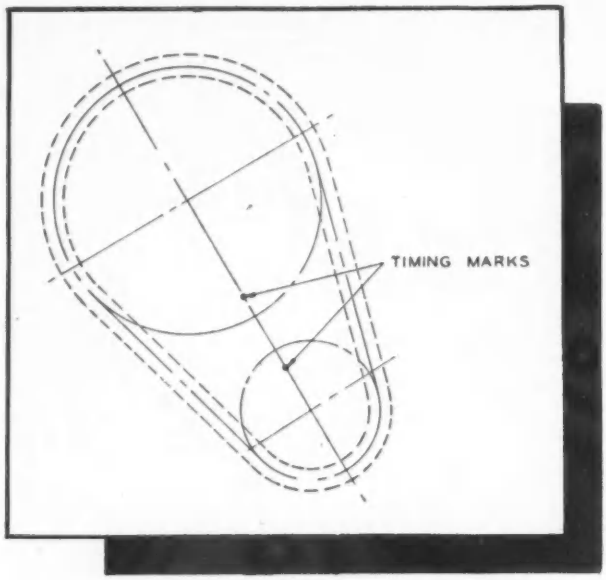


Fig. 4—Timing marks for closely-spaced sprockets.

4. Weight of tappet assembly and valve.

5. A plot of the load vs. displacement of the valve spring, and the initial load of the spring when the valve is closed.

6. The maximum operating speed of the engine.

A convenient system to carry out the calculations is to set up a table as shown below.

1 Cam Angle	2 Accel. in./sec²	3 Mass × Accel. lb	4 Lift, in.	5 Spring Force, lb.	6 Total Force, Col. 3 + Col. 5	7 Torque Radius, in.	8 Torque Col. 6 × Col. 7

Column 1 is the angle through which the cam has rotated. It has been found adequate to use increments of 5 deg. It is suggested that the position of 0 deg. be selected as that of zero lift. The cam contour of the lift side is all that has to be considered.

Column 2 is the acceleration of the valve lift and is best expressed in in. per (sec).² Most valve lift and acceleration diagrams are plotted against the angle of cam rotation, therefore, a conversion of the units of acceleration of in per (deg)² to in. per (sec)² is necessary. This conversion is made using the maximum engine speed.

Column 3 is the product of the mass of the valve and tappet assembly and the acceleration. This is the inertia force of the system. Attention is called to the fact that if the acceleration is expressed in in. sec,² then the mass must be expressed as lb sec²/in., which is obtained by dividing the weight of the parts in lb by 386 in./sec² which is the acceleration of gravity.

Column 4 is the lift of the valve for the particular cam angle in question. This lift value is used to obtain the spring deflection and thus the spring force.

Column 5 is the total spring force acting on the assembly and can be obtained directly from the load-deflection curve of the spring or by multiplying the lift in in. by the load-deflection constant of the spring in lb/in. and adding the initial load in lb.

Column 6 is the sum of the inertia force Column 3 and spring force Column 5. Note that when the valve is being accelerated the inertia force is positive, and when it is being decelerated the inertia force is negative.

Column 7 is the radius on which the force is acting. This radius is obtained graphically by locating the point of tangency of the tappet and cam contour and measuring the lever arm. This operation is illustrated in Fig. 2.

Column 8 is the resultant torque on the camshaft and camshaft drive for one valve tappet assembly, obtained by multiplying Column 6 by Column 7.

This type of calculation should be made for both the intake and exhaust valves. Plotting a torque curve for one revolution of the camshaft is the next operation to perform. This is accomplished by plotting the torque results in the proper phase relation for the camshaft being analyzed. A torque curve of the sum of the loads of the accessories and the valve load should be plotted to obtain the total torque to be imposed on the drive. This is highly recommended because it is the only way the true effect of the periodic torques can be realized. The fuel pump usually gives a torque rising to a maximum once per revolution of the camshaft, the oil pump imposes a rather steady load, the distributor a light and steady load, and the cams give as many torque fluctuations per revolution of the camshaft as there are cylinders in the engine. These peaks could occur twice the number of cylinders in the engine if the geometry of the camshaft were such that an intake and exhaust valve did not open at approximately the same time.

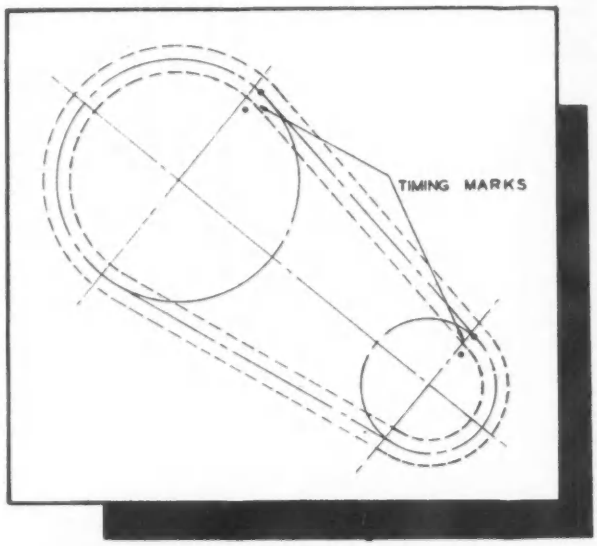


Fig. 5—Timing marks on chain and sprockets for installations where sprockets are widely spaced.

The maximum tension in the timing chain can now be obtained by dividing the peak camshaft torque by the pitch radius of the camshaft sprocket. The suggested width of chain is obtained by dividing the computed maximum chain tension by 65 lb per in., which is the recommended peak working tension for a one in. wide chain.

Maximum Operating Speed

The maximum speed is important for other reasons than that of giving a speed at which to compute the torque. The maximum operating speed is important with regard to the chain because the links rotate on the pins, as the chain engages the sprocket, at the same rate that the sprocket is turning, and the greater the rate of rotation the more heat of friction is developed, and greater wear occurs. In six cylinder engines the third order torsional vibration of the crankshaft usually enters the picture at speeds near the maximum for the engine. The torsional deflection resulting from this vibration is a maximum at the free end of the crankshaft where the timing chain is mounted. These deflections if not suppressed to less than ± 0.15 deg will induce stresses in the chain which will greatly increase the wear of the entire drive.

A factor which is often overlooked, or discounted entirely, is that of crankshaft bending. It is in this manner that a six cylinder in-line engine may stress a camshaft drive much more severely than an eight-in-line engine. This is apparent when the crankshafts of these two types of engines are analyzed as a continuous beam for the maximum bending moments. It will be found that because of the difference in the phase of the load application of the six and eight cylinder engines the resultant bending moment at the front main bearing may be much greater in some six cylinder engines than in the eight. This bending moment deflects the crankshaft so as to lengthen and shorten the center distance of the drive. Naturally this action imposes a vibratory load on the drive mechanism. This higher load makes the required width of a chain proportionately greater.

Natural Frequency of the Timing Chain

A strand of linked chain under a tensile load may be treated as a flexible string when its vibrational properties are being studied. The natural frequency of the first node of vibration of the tight or driving strand of chain may be expressed as

$$f = \frac{19.647}{2L}\sqrt{\frac{T}{w}}$$

where T = average tension of the chain (lb)
w = weight of chain per inch (lb/in.)
L = length of strand (in.)

Consideration of this phase of the problem is very important because the condition of an exciting force occurring at the same frequency as the natural frequency of the tight strand of the chain will cause this strand to vibrate through large stress-inducing amplitudes. This calculation is difficult to make accurately because the average chain tension (T) must be known. In order to determine the average tension (T), all of the loads considered previously, plus the friction of the drive, must be known. This tension can be measured experimentally on a dynamometer by measuring the torque required to drive the camshaft and the attached accessories. However, if an engine is not available an approximate figure may be obtained by determining the root mean square value of the camshaft torque curve previously plotted and adding an estimated amount for the friction.

Those forces which are most likely to excite the chain are in their order of importance as follows:

a. The torque fluctuations of the camshaft as caused by lifting the valves.
b. Bending vibration of the crankshaft.
c. Torsional vibration of the crankshaft.
d. Pitch line eccentricity of the sprockets.
e. Unbalance of the camshaft sprocket.

In many cases the condition of synchronization of the exciting forces and the natural frequency cannot

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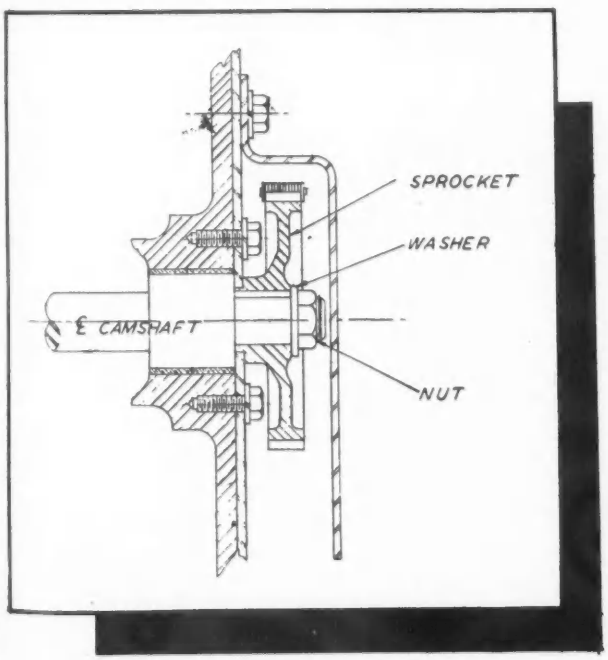


Fig. 6—A conventional method of mounitng a sprocket to a camshaft.

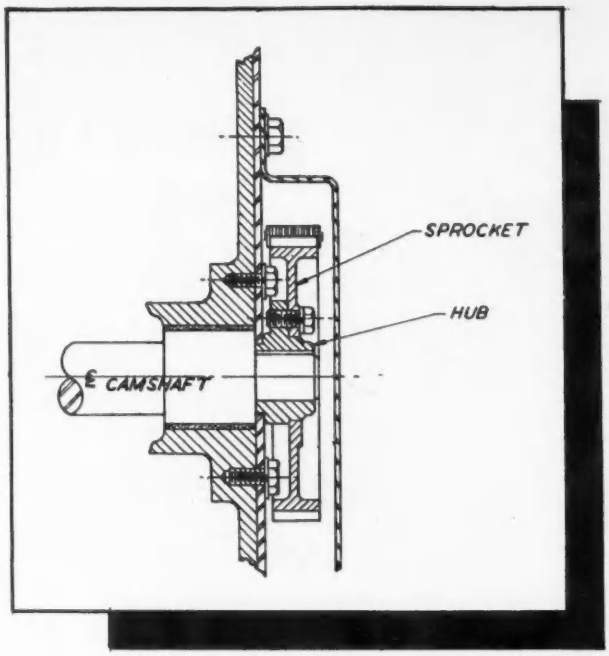
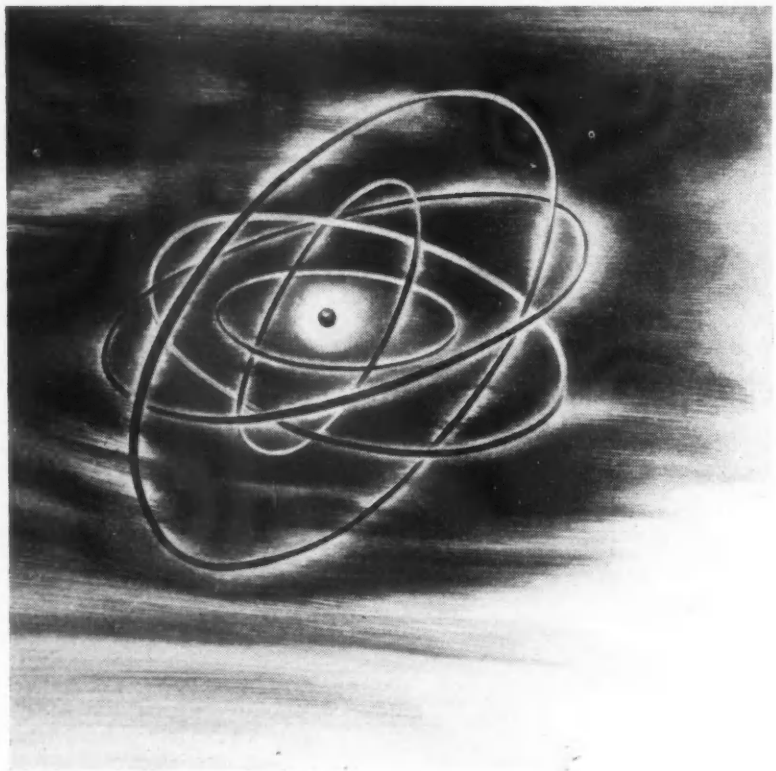


Fig. 7—This method of mounting a camshaft sprocket permits simplified chain replacement.



Telltale I

INDUSTRY stands to benefit from the use of isotopes in several fields of research, particularly in fundamental chemistry; and direct application to its own problems are potentially as broad and varied as the industrial structure itself. In comparison with the possibilities, today's applications are few and far between. Extreme caution is called for in the development of many of the most promising services that radiations can perform, such as the treatment of materials or the automatic control of factory processes. However, more than 40 industrial organizations are already using radioisotopes in research and development programs.

Tracer Applications

The powerful signals emitted by radioisotopes have been used to follow and measure a variety of industrially important substances otherwise untraceable, from the impurities in a batch of molten steel to the invisible coating on a wisp of thread. Manufacturers of steel, machinery, rubber, gasoline, oil, plastics, rayon, chemicals, drugs, and a rapidly growing list of other products are looking to these researches to bring better and more economical production.

The entire field of metallurgy is certain to be greatly influenced by tracer investigations already under way on the structure, manufacture, alloying, durability, corrosion, and friction of metals. The Industrial Radiography Laboratory in Beaumont, Texas; Arthur D. Little, Inc.; Massachusetts Institute of Technology; Socony-Vacuum Oil Co.; Stevens Institute of Technology; and Westinghouse Electric Corp., all report projects in this field; and the radioisotopes of more than a dozen elements are being used, including iron, calcium, carbon, sulfur, phosphorus, cobalt, silver, nickel, tungsten, copper, and zinc.

The power of these new investigative tools makes them extremely versatile. A tiny quantity of radiosulfur, for example, added to 24,198 pounds of mixed coal, enabled investigators to determine later what proportion of the sulfur impurities in the finished steel came from the coke and what proportion from the iron. Radiophosphorus, added to a molten batch of steel, joins with the phosphorus already present and thereafter, by its radiations, reveals the quantity of this impurity that still remains in the mix at various stages of processing. Radiocarbon incorporated into iron during the coking process, provides investigators with a method of studying the diffusion of carbon in iron, a matter of great importance in the subsequent manufacture of steel. Radio-iron, used in friction experiments, has been able to reveal the transfer of less than one hundred billionth of an ounce of metal from one moving surface to another. Piston rings and other engine parts have been made radioactive in the Oak Ridge pile for use in these latter studies.

Many of these metallurgical experiments take advantage of the technique of autoradiography, in which the precise distribution of the isotope-tagged material is photographed by the direct application of a film to the sample being analyzed.

Petroleum Industry

In the petroleum industry, the uses of isotopic tracers, both actual and potential, range all the way from the surveying of the location and quantities of raw materials underground to the testing of the final product in operating engines. Radiocarbon, of course, is the most important isotope here; the Shell Oil Co. and the California Research Corp. use it to follow the changes through which crude oil goes in modern cracking processes, and the Texas Co., to study the process for manufacture of synthetic gasoline from coal and

Isotopes

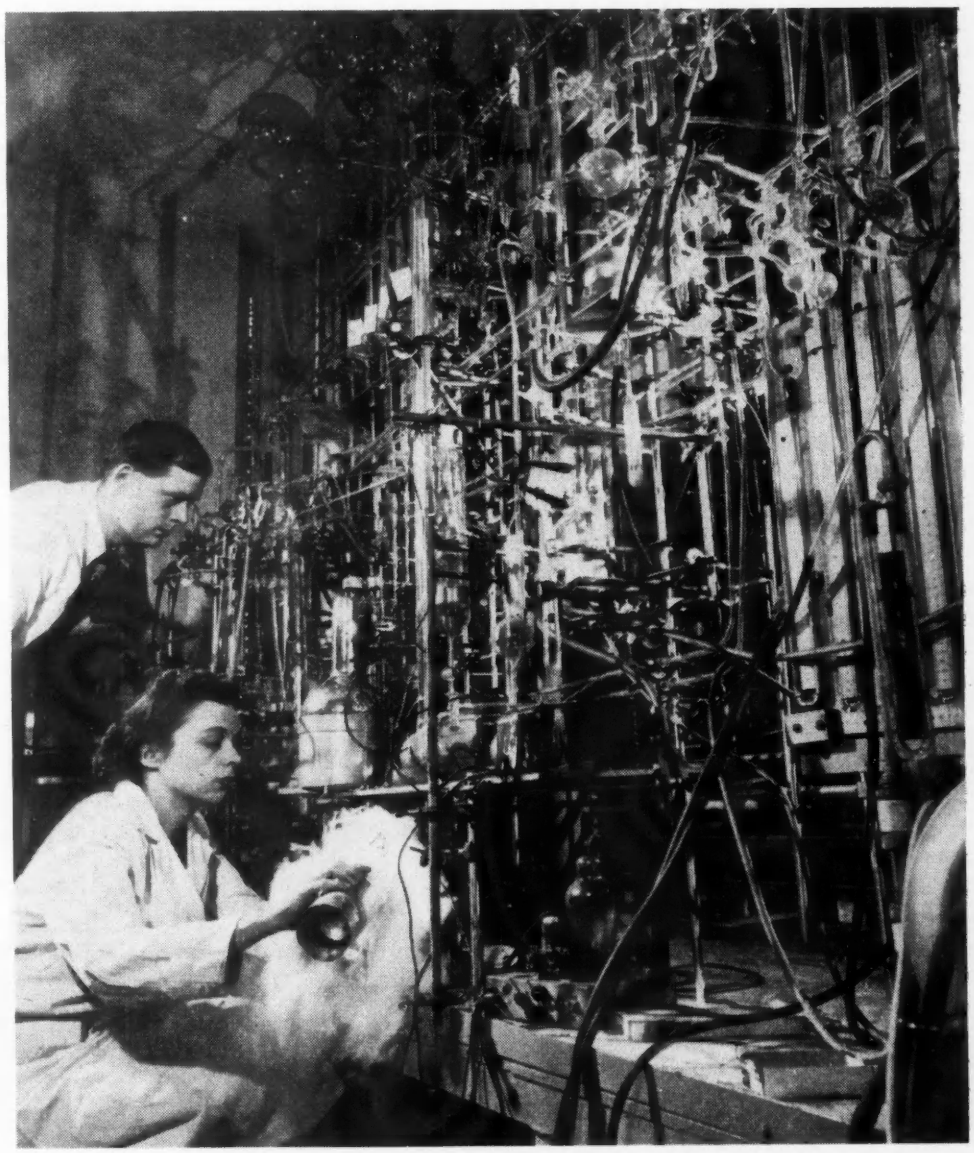
Reveal Secrets to Industry

PART TWO

RESEARCH in Heretofore Hidden Phases of Making Synthetic Gasoline from Coal and Natural Gas, of Processing Steel, Rubber and Other Materials, Tracing Flow of Crude Oil Underground and Special Friction Experiments Now Possible with Isotopes. These and Other Applications Are Summarized in This Article, Which Is the Second and Concluding Installment of a Series of Two Articles on the Use of Atomic Science by Industry That Began in the Oct. 1 Issue (Page 24) of Automotive Industries.

natural gas. A subsidiary of the Gulf Oil Corp. is using radiocobalt to determine the rate of settling of rust inhibitors and other substances added to lubricating oil; and the Socony-Vacuum Oil Co. reports that radio-iron makes possible friction measurements with a sensitivity of one part in ten million (Recently Socony-Vacuum made a grant of $250,000 at the rate of $50,000 per year to Massachusetts Institute of Technology to be used for making basic studies in nuclear science and engineering.—Ed.)

In the study of oil fields, the availability of radioisotopes of such elements as iodine, chlorine, cobalt, and calcium is expected to result in new information about underground strata. Moreover, consideration is being given to tracer explorations of underground stores of fuel; radioisotopes in



Two Gulf Oil Co. scientists are probing into the still mysterious reaction by which gasoline is made from coal. A fog of condensed air rises as a dewar flask is filled with liquid nitrogen preparatory to precipitating a sample of coal-made gasoline. An important feature of this research project is the use of radioactive isotopes to trace the course of the reaction.

Industrial Users of Isotopes

Shell Development Co.—Physics.
Union Oil Co. of Calif.—Research.
American Cyanamid Co. Stamford Laboratories—Chemistry and Physics.
E. I. Du Pont de Nemours and Co.—Chemistry.
American Scientific Co.
Sinclair Refining Co.—Catalysis Research.
Arthur D. Little, Inc.
Atomic Instrument Co.
General Electric Co., Thomson Laboratory.
Raytheon Manufacturing Co.—Special Tube Section.
Sylvania Electrical Products, Inc.—Engineering.
Detroit Edison Co.
Dow Chemical Co.—Spectroscopy Laboratory.
Ford Motor Co.—Chemical and Metallurgical Research.
R. C. A. Laboratories—Tube Research.
Socony-Vacuum Oil Co., Inc.—Research and Development.
U. S. Rubber Co.—Physical Research.
Distillation Products, Inc.—Biochemistry.
Eastman Kodak Co.—Photographic Theory.
General Electric Co.—General Engineering Laboratory and High Frequency Laboratory.
Sun Chemical Corp.—Physical Chemistry.
The Texas Co.—Research.
B. F. Goodrich Co.—Physical Research.
Goodyear Tire and Rubber Co.—Physical Research.
Monsanto Chemical Co. — Physical Chemistry.
Phillips Petroleum Co.—Research.
General Aniline Film Corp.—Central Research Laboratory.
Gulf Research and Development Co.—Physics.
Houdry Process Corp. of Pennsylvania—Fundamental Research.
Westinghouse Research Laboratories—Magnetism, Metallurgy and Ceramics.
Fairchild Engine and Airplane Corp.—NEPA Division.
Industrial Radiography Laboratory.
American Smelting and Refining Co.—Agricultural Research.
Consolidated Engineering Corp.
National Technical Laboratories.
Stuart Oxygen Co.—Heavy Water Dept.
Standard Oil Company of Ind.—Research.
Metal Hydrides, Inc.
National Research Corp.
Bell Telephone Laboratories, Inc.
Vickers, Inc.—Otto Saslaw Laboratory.
Brush Development Co.—Crystal Research.
Allied Chemical and Dye Corp., Barrett Division.
Sun Oil Co.
Westinghouse Electric Corp. — Research Laboratories.
Humble Oil and Refining Co.—Research and Development.

batches of oil or gas injected into a well, will be sought in samples from neighboring wells, and the resulting information about the underground routes in various parts of the field may make possible more efficient drilling procedures.

Similarly in other industries, tracer isotopes are throwing new light on fundamental problems. The way in which vulcanization and polymerization processes operate in the manufacture of rubber are being investigated—by the Goodyear Co., for instance—with the radioisotope of sulfur, the element that plays a primary but still largely mysterious role in these processes. The same isotope is solving a problem that has long made trouble in rayon manufacture, where sulfur must be added at one stage of the process and later removed because it lessens the strength and durability of the final product. Previously it was impossible to determine at what stage of the process the sulfur had been eliminated; now a bit of the radioisotope mixed with the sulfur in a test batch gives this information with extreme accuracy. Also in the rayon industry, the isotopic technique demonstrated its incredible delicacy when radiosodium succeeded in measuring accurately the coating on a tiny fraction of an inch of thread so fine that it weighs less than an ounce to the mile.

Uses of Radiation

Availability of scores of radioisotopes, each offering its characteristic type and intensity of energy emission, will soon bring the power of radioactivity into the service of industry on a scale not equalled or even approached in the past. The possible uses are so varied and so unexplored that present speculation can only vaguely indicate them. There are two broad fields of such application.

First, radiations have powers—recognized but as yet little understood—to affect chemical reactions involving the hydrocarbons and other substances entering importantly into industrial processes. At the Massachusetts Institute of Technology, for example, chemists have been able, by the use of radiations, to convert certain fatty acids into paraffinic or straight-chain hydrocarbons, which compose a sizable part of petroleum. The future may see some manufacturing processes accelerated or produced at lower temperatures, and others rendered possible for the first time, when the chemists and engineers have learned to make radiation play its role in such reactions.

Second, radiations provide industry with a powerful and flexible measuring and analyzing tool. In the future, radioisotopes will be at work in factories doing a great variety of jobs that cannot be done at all today—measuring the thickness and size of objects to millionths of an inch or of a gram; revealing the internal condition of apparatus—the extent of corrosion inside a pipe, for instance; making photographs (radiographs) of opaque materials; analyzing the quality of products; and even controlling the operation of production machinery.

Radiation at Work

A few beginnings have been made in the application of radiations to industrial processes. Probably the oldest application is in oil-well logging, where radiomaterials lowered along with detection apparatus into wells have provided valuable information by the manner in which they were reflected from the different materials lining the walls of the shaft. One of the newest applications is the use of radiations to dis-

sipate hazardous and hampering static electricity, which collects on belts, rolls of paper, and other moving materials in factories. The Goodyear Co. reports the development of a gage in which radiocarbon measures the thickness of a sheet of Pliofilm on the production line accurately to hundred thousandth of an inch. It is noted that the signal from this gage, amplified and hooked up with the production machinery, could actually be used to control the thickness of the film.

Such automatic process controls are an obvious extension of the measuring and analyzing function of radiation; but their application, like many of the most interesting applications of radiomaterials to industrial processes, must come gradually along with the development of technical understanding and safe procedures. Of first importance in industry today—as in medicine and agriculture—is the new fundamental knowledge that isotopes as tracers are revealing in the laboratories.

Business in Isotopes

The businessman has reason to be interested in isotopes. Their utilization in scientific research has created a demand for new kinds of equipment and services which will continue to grow very rapidly in the years ahead. Their application to industrial problems opens an immense field for future development.

In the pioneer radiation laboratories now operating, research scientists have been forced to master many unfamiliar techniques and to improvise most of the equipment they use. They have had to double as mechanics in the design of special tools, as radiochemists in the preparation of radioactive compounds, and as electronics engineers in the operation of their instruments. Such laboratories today constitute a rapidly growing market for a great variety of equipment and services—new equipment for the assay of radiations, for protection against radiation hazards, and for the handling of radiomaterials; yet-to-be-provided services for the design of laboratories, the maintenance of complex instruments, and the preparation of organic and inorganic compounds labeled with radioisotopes. As rapidly as these present demands are supplied, new projects will get under way, new research will be possible.

The supplying of these growing demands is a job for business. With the Commission furnishing the basic pile-produced isotopes required for the manufacture of radioactive compounds, private industry is in a position to provide all of the equipment, materials, and services needed by isotope tracer laboratories today. Already, electronics firms have taken the lead in developing radiation detection instruments. Enterprising companies are beginning to offer prepared radioactive compounds. And some are thinking in terms of more complete services for research workers.

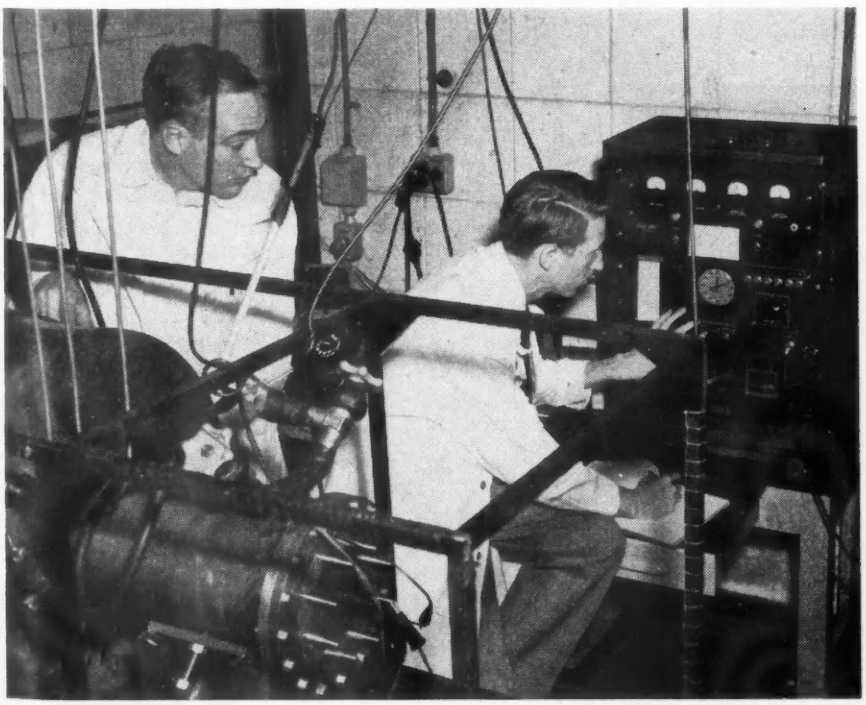
The firms going into this field are looking beyond today's market, in which eight out of ten isotope research projects are concerned with basic science, fewer than one out of ten with industrial problems. Of course, the supplying of laboratories and hospitals can be a good-sized business in itself. But the potential application of isotopes to the work of industry—for the control of processes, the testing of products, and the development of entirely new processes and products—is an open field of opportunity. It is the kind of field that American competitive industry is uniquely fitted to develop.

Reports by Users of Isotopes

Of the many companies and institutions using isotopes, extracts from reports of a few of them relating how they are using this new research tool and what progress they have made with it are reproduced herewith:

ALLIED CHEMICAL & DYE CORP.—Experiments have been started using deuterium (H 2) as a tracer on the quantitative determination of the residual water or hydroxyl content of alumina samples. It is anticipated that at elevated temperatures an exchange reaction will occur between gaseous deuterium and chemically bound water in the alumina. It is planned to follow the change in the deuterium content by thermal conductivity measurements or, if necessary, by the mass spectrometer.

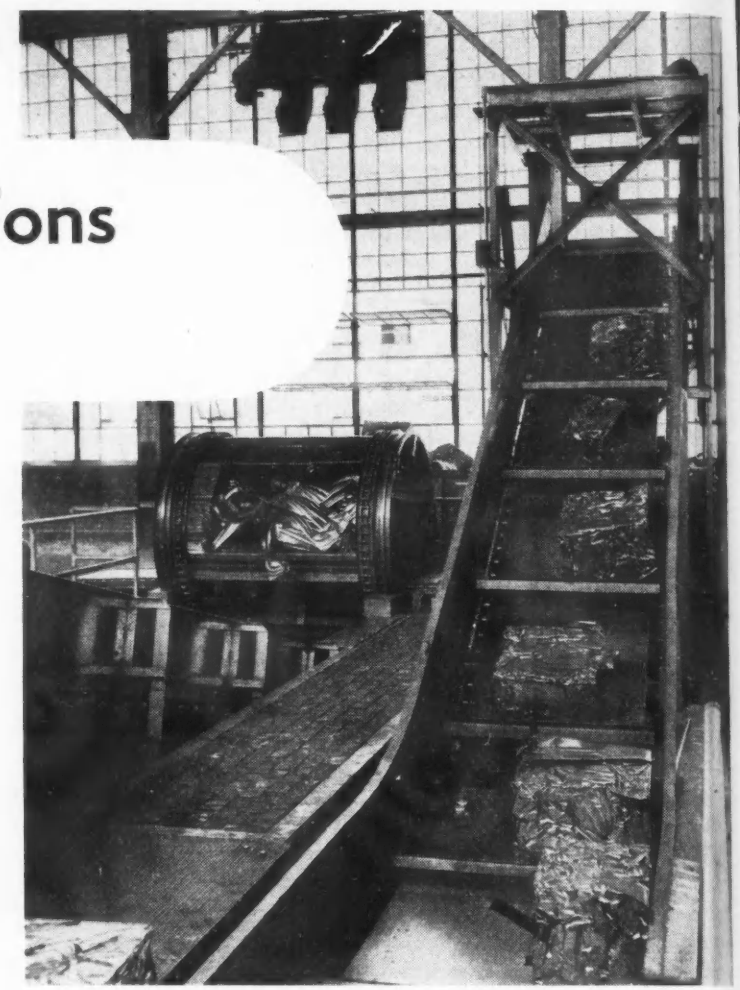
(Turn to page 94, please)



At the Clinton Laboratories the energy radiation emitted by a radioisotope is being determined. In the left foreground is a beta ray spectrometer which uses a magnetic field to separate particles of different energy.

Automatic Machine

Bales Over 110 Tons of Scrap Daily



This conveyor carries bales of steel scrap to an elevated station from which they are loaded into a freight car. In the left background is shown a skid box in the scrap turnover which empties into the loose scrap conveyor.

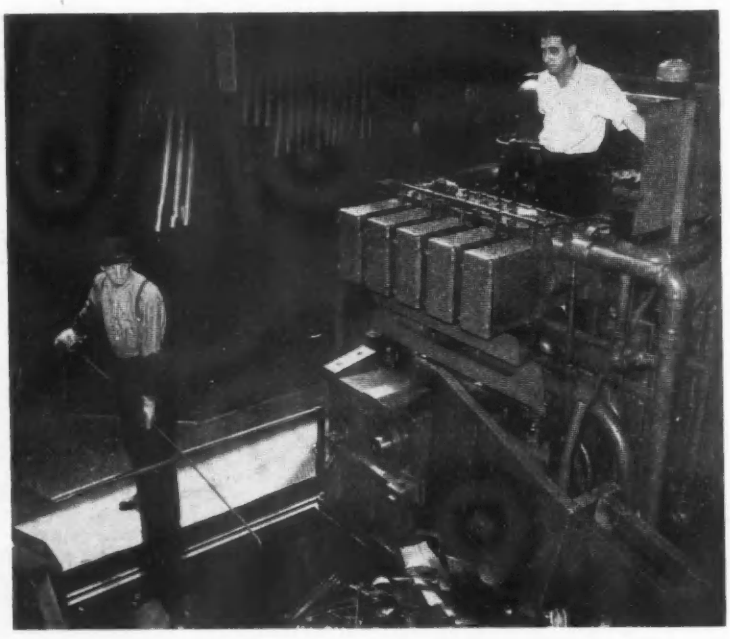
OPERATING around the clock, three shifts a day, the press shop of the De Soto Division, Chrysler Corp., is consuming, on the average, 500 tons of sheet and strip steel a day. Sheet steel of good drawing quality is scarce and users are finding considerable variation in quality and a high percentage of "offal." To operate its press shop most efficiently under the circumstances, De Soto has established a compact and effective department for salvaging stampings and serving at the same time as a center for baling press scrap.

Illustrated here is an installation of one of the largest automatic baling machines to be found in the industry. In an automatic cycle it prepares densely compressed scrap bales of uniform size and weighing about 300 lb. The continuous operation of the set-up turns out about 750 bales per day in the three shift schedule.

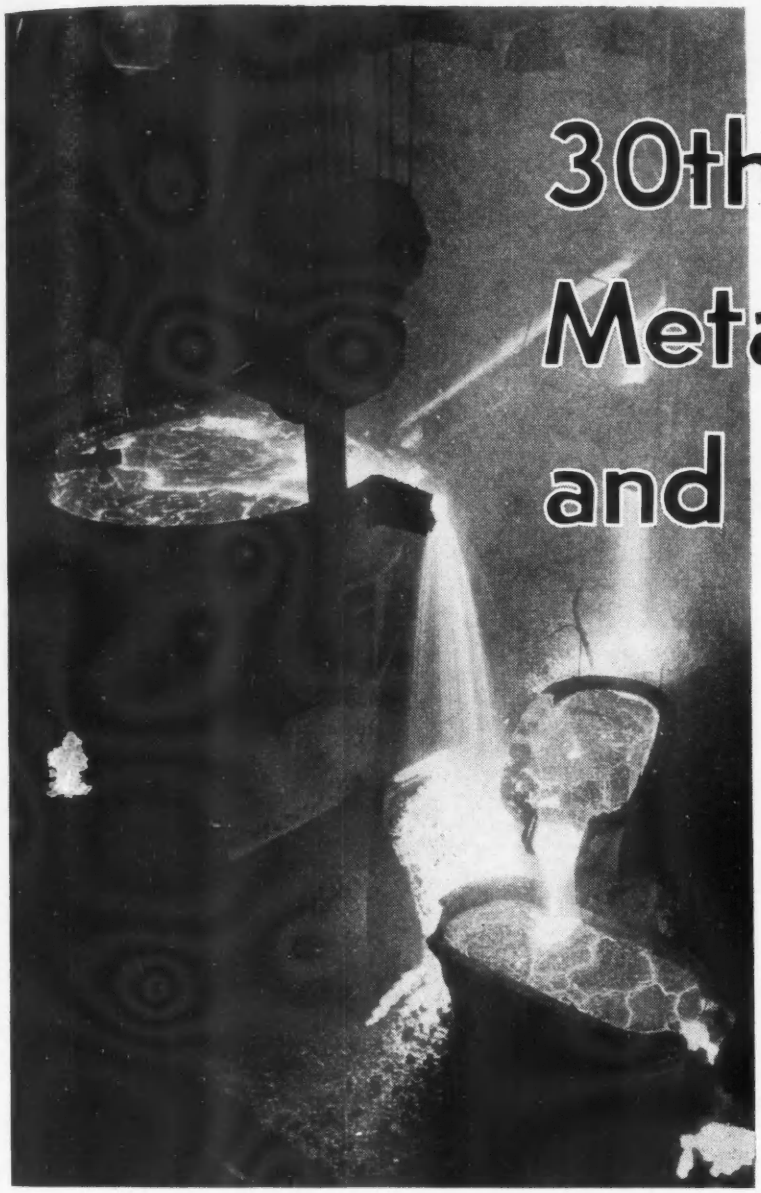
Considerable ingenuity was exercised in the layout of the scrap baling operation to achieve compactness with the minimum of handling. Parallel to the axis of the baler, a short distance away in the background, is a gravity roller conveyor track onto which are loaded the metal skids carrying scrap from various parts of the press shop. The skids are pushed one by one into a large roll-over fixture which serves to dump a skid load into a section of the power driven lowerator conveyor feeding directly to the loading station of the baling machine. The operator of the unit controls the roll-over fixture, the movement of the lowerator, and starting of the baler cycle by means of push-buttons.

The baler cycle is completely automatic—loading, compressing, unloading—and the

(*Turn to page* 64, *please*)



Operator at upper right controls the roll-over fixture, the movement of the lowerator, and starting of the baler cycle.



30th National Metal Congress and Exposition

WHEN the 30th National Metal Congress and Exposition is held Oct. 23-29 in Philadelphia, among its highlights will be the celebration of the 75th anniversary of the alloy steel industry. During the week of activities the contributions of alloy steels, which began in a bridge built 75 years ago over the Mississippi River at St. Louis, will be presented by display, by picture, by story, by honors and awards.

The American Society for Metals, the American Welding Society, the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing are the cooperative sponsors of the Congress. The 312 exhibitors at the Exposition are listed on page 60 of this issue and many of their new products are presented on the following pages.

Exhibits, both operating and non-operating, will present what is new and improved in ferrous and nonferrous metals, welding supplies and equipment, heat treating equipment, foundry supplies, inspection aids, metal cutting and machining equipment, and tools. In addition to the exhibits, each of the sponsoring societies has programmed a full schedule of technical papers, educational courses, special lectures and meetings, as well as social events.

A two-day seminar on the "Cold Working of Metals" will be the opening American Society for Metals event of the Congress, and will be held in five sessions on Oct. 23 and 24. In addition to the regular ASM technical sessions during the Congress, there will be three educational lecture courses, which have been carefully selected by the Society's Educational Committee, entitled "Properties of Metals in Materials Engineering," "Grain Control in Industrial Metallurgy," and "Metallurgy and Magnetism."

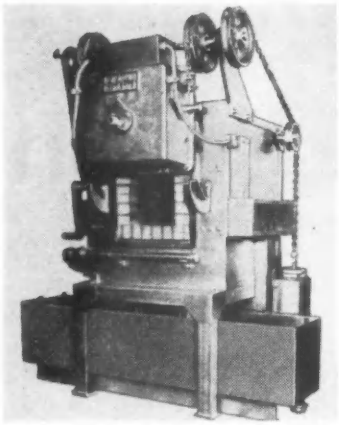
Twelve classifications of micrographs will be displayed at the Third ASM Metallographic Exhibit which will be shown from Oct. 25 to 29, and prizes will be awarded together with honorable mention in each classification.

In 21 sessions during the National Metal Congress, the American Welding Society beginning Oct. 25 will present 66 papers covering every branch of the welding field. A symposium on "Rod and Wire Production Practice" will be an outstanding feature of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers which will hold its annual fall meeting in conjunction with the Congress. The division has scheduled 40 papers. During the two-day annual meeting of the Society for Non-Destructive Testing, to be held Oct. 27 to 28 during the Congress, four technical sessions are planned, during which the 1948 Mehl Lecture will be given by Floyd A. Firestone, consulting physicist, Washington, D. C., on the Supersonic Reflectoscope.

(*Turn to page* 86, *please*)

MS-1—Four New Special Furnaces

A new model all-purpose controlled atmosphere furnace, a new model continuous flow vibrating hearth furnace with salt quench tank for martempering or austempering, and the recently announced "Hi-Life" pot furnace will be shown for the first time by Lindberg Engineering Co., Chicago, Ill., at the Metal Show in Philadelphia, Oct. 25 to 29.



Lindberg continuous flow vibrating hearth furnace with salt quench tank

The all-purpose controlled atmosphere furnace is suitable for hardening both high speed and air hardening steels. The furnace is also built for brazing and sintering operations. Heating is by Globar elements, and the unit is built to operate at temperatures to 2500 F. A propeller type fan is built into the top part of the cooling chamber to circulate the protective atmosphere within the chamber and provide faster more uniform cooling. Protective atmosphere for both the heating chamber and the cooling chamber is provided by a generator. Both charge and discharge door are operated by air cylinders.

The Lindberg continuous flow vibrating hearth furnace, a controlled atmosphere unit, is designed for hardening small parts. The vibrating of the hearth moves the work through the work chamber to a chute through which the parts fall into the quench. With the vibrating hearth, parts flow by high frequency vibration instead of hopping, as the result of intermittent abrupt impulses. Movement of the hearth is not perceptible to the eye, and there is no jarring of the furnace equipment.

Provided with the furnace is an oil quench tank, or a salt quench tank (to be exhibited) for martempering or austempering operations. The furnace is built for temperatures to 1800 F., and is electrically heated by heavy nickel-chrome elements.

The recently announced Lindberg "Hi-Life" pot furnace features cyanide pots. Also to be exhibited is the new Lindberg high frequency induction heating unit.

New Products at the Metal Show

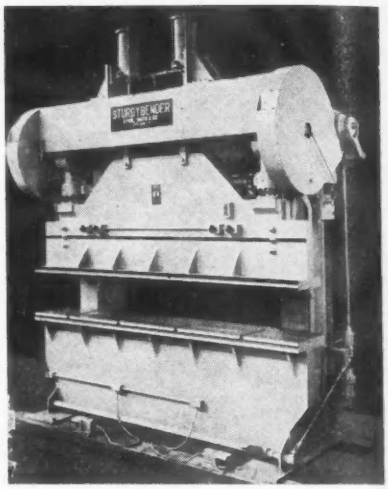
For additional information regarding any of these items, please use coupon on page 68

MS-2—Wide Bed Press Brake

A Sturdybender brake of latest design, embodying all recent improvements will be on display by Cyril Bath Co., Cleveland, Ohio, at the Philadelphia Metal Exposition. It is claimed capable of operating at a speed of 50 strokes per minute in continuous operation, in contrast with a speed of 30 strokes per minute, said to have been standard speed for a machine of this kind in the past.

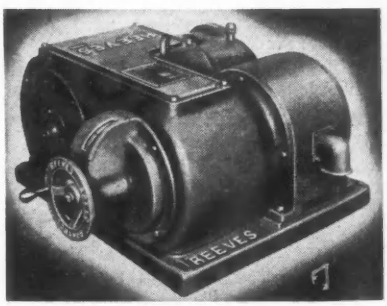
The brake will be equipped with a wide bed and ram angle attachments, which are removable, but which will be used to support punching and notching dies as well as the conventional bending tooling. These attachments permit the press brake to do punching, bending, notching, blanking, and forming.

A series of automatic controls replace the conventional foot treadle or hand lever. A series of palm buttons is mounted on the face of the ram which, when used in conjunction with a selector switch mounted on one end of the machine, can be set for continuous operation or single cycle operation, or operation only as long as the buttons are depressed. A foot button attached to the machine by a flexible cable will also be included to control the machine at a distance if desirable because of size of the piece of metal being processed.



Cyril Bath Sturdybender press brake

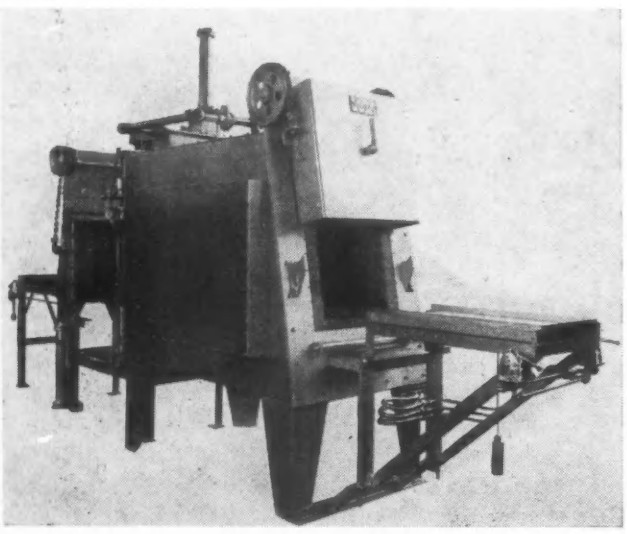
MS-3—Variable Speed Motor Drive



Reeves Vari-speed Motodrive

On display at the Metals Show, by the Reeves Pulley Co., Columbus, Ohio, will be running models of the Reeves variable speed transmission, vari-speed motor pulley and vari-speed motodrive, along with the mechanical, electrical and fully automatic controls which are adaptable to Reeves equipment.

The Reeves variable speed equipment has many applications in the automotive, tractor and aircraft industries, including materials handling systems and



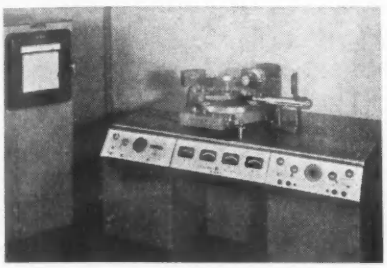
Lindberg all - purpose controlled atmosphere furnace

conveyors, heat treating furnaces, foundry mold conveyors, and inspection and testing units, and can be applied to all machine tools used in the machine shop.

MS-4—X-Ray Diffusion Analyzer

At the Thirtieth National Metal Exposition, Oct. 25-29, at Philadelphia, the General Electric X-Ray Corp., Milwaukee, Wis., will show its revolutionary new XRD-3D unit which opens broad new fields of application for X-ray diffraction in the identification and quantitative analysis of unknown materials.

To illustrate the benefits of X-ray diffraction, the company will show radiographs covering the inspection of jet engine parts, correlating them with the actual part from the TG-180 Jet



G.E. X-Ray diffraction analyzer, unit XRD-3D

Engine, which will also be on display.

The new unit couples, for the first time, precision control of x-ray output with high x-ray intensity. Hitherto, such accuracy could be achieved only at the expense of intensity. This was reflected in the comparatively low milliamperage at which such machines were operated. Now, accurately-controlled x-ray diffraction beams of higher intensity can be produced. The tube can be operated at milliamperages up to 30.

X-ray intensity of the unit is controllable and reproducible to an overall accuracy of 0.5 per cent. The accuracy is accomplished by controlling the x-ray tube voltage to within 0.1 per cent and the tube current to within 0.02 per cent.

Because higher intensity makes it possible to direct a comparatively narrow beam of x-radiation from a very narrow source to the specimen under observation, both the resolution of spectral lines and the speed of analysis are said to be greatly increased.

The high output is achieved through use of a new sealed-off diffraction tube with three pure beryllium windows, which are within one inch of the end and the focal spot of the tube. Carefully-controlled focal spot size and distribution also contribute to the output. The tube is excited from a high-voltage transformer and full-wave rectifier rated at 50 kv.p., 50 ma., continuously.

The new instrument may be used, with different attachments, for three different purposes:

One of these is for the direct measurement of x-ray diffraction intensities through the use of a Geiger-Mueller counter in combination with a rate meter, scaler and chart recorder. The counter is capable of counting diffracted x-ray quanta lineally over a longer range of intensities than ever before possible, it is said. The rate meter, which is matched with the strip chart recorder, has a logarithmic response over three decades.

The second manner in which the unit may be used is as a fluorescent x-ray spectrometer, employing a focusing crystal analyzer.

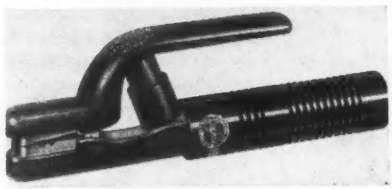
Third, it may be employed, with x-ray-sensitive film, as a conventional x-ray diffractor unit.

New Products at the Metal Show

For additional information regarding any of these items, please use coupon on page 68

MS-5—Arc Welding Electrode Holders

Jackson Products, Warren, Mich., are showing five new models of arc welding electrode holders this year at



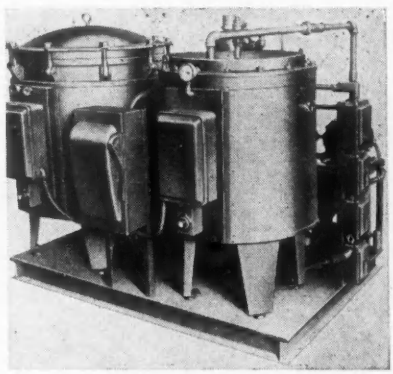
Jackson arc welding electrode holder, model A-WC

the 30th National Metal Exposition to be held in Philadelphia, Oct. 25 to 29. To designs of their "Featherlight" holders the company has now added models of forged copper alloy, with replaceable jaws of Mallory metal. These improved jaw insulators on all insulated holders are claimed three times stronger than jaws formerly marketed.

MS-6—Oil Conditioners and Filters

The Hoffman oil conditioner and the Hoffman model pressure filter will be exhibited at the Metal Show by the U. S. Hoffman Machinery Corp., N. Y. C. The conditioner reclaims run-in and hydraulic oil (also crankcase), to near-new clarity. For use in aircraft a disc filter was originated, and is also displayed.)

The new conditioning unit consists of a Hoffman cartridge type filter and a Hoffman Vaporizer, mounted on a common base, portable if desired, complete with all necessary electric and piping

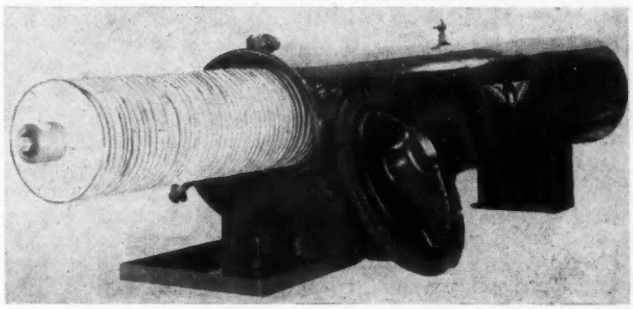


Hoffman oil conditioner

connections. Flexibility of operation makes it possible to operate the filter and vaporizer together or independently as desired. When operated as a unit, impure oil first passes through the filter where all insoluble matter, such as metal, gums, tars, residues, soot, carbon, dirt, sand and acid (if required) are completely removed. Filtered oil is then drawn in the Vaporizer where all solubles such as water (free and emulsified), fuel dilution, air, gases, etc., are completely extracted. Tests have shown the Hoffman oil conditioner to be especially useful in the purification of turbine, circuit breaker, transformer, vacuum pump, cable, compressor, hydraulic and refrigerator oil, etc.

In addition to these products the company will display a Hoffman model pressure filter. Finally there will be a working model of the Hoffman flotation unit which removes waste solids from soluble oil and water coolants.

The Hoffman flotation unit utilizes



Hoffman disc filter originally designed for aircraft, now adapted for industrial application

a Fafergren type rotor-stator assembly, mounted in the cell and driven by electric motor through multi-V-belts. Rotating at a peripheral speed of 1000 to 1500 feet per minute, the rotor aerates the dirty coolant in the tank, producing a dispersion of air bubbles throughout the coolant in the cell. In rising through the liquid, these bubbles attach themselves to the solid particles and carry them to the surface, where they are entrained in the froth.

MS-7—Four-Foot Press Brake

A new machine just on the market is model No. 131 press brake, manufactured by Dreis & Krump Mfg. Co., Chicago, and to be displayed at the

Dreis & Krump No. 131 press brake

Philadelphia Metal Exposition. The machine has a capacity to bend 4 ft of 18 gauge mild steel plate. Dies are the same standard types used on all press brakes. All operations are performed in the same manner as on the larger machines. Smooth operating friction clutch and vari-speed drive are valuable adjuncts to the operator's skill. Design entails all steel construction and all steel enclosed gearing.

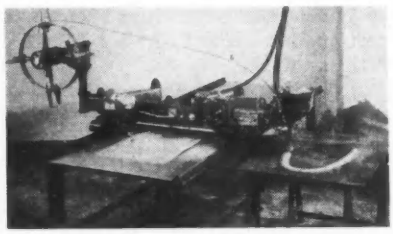
Standard equipment includes lower die holder, vari-speed drive, back gauge and motor and control for two or three phase, 50 or 60 cycle, 220 or 440 volt current.

MS-8—Shape-Welding Machine

For making welds to any outline by its submerged-melt welding process a new unionmelt shape-welding machine, the WM-6, has been announced by the Linde Air Products Co., Unit of Union Carbide and Carbon Corp., N. Y. C.

The WM-6 machine, a carriage of the type that has proved most useful in oxyacetylene shape cutting, carries and guides a Unionmelt welding head. Any desired outline can be followed by use of a strip templet.

The Type U welding head illustrated has a maximum current capacity of 2000 amp and can weld in a single pass material from 18-gauge to 1¼ in. plate. Heavier parts of almost any thickness can be welded by a suitable number of passes.



Linde unionmelt shape-welding machine

The machine operates over an area 34 in. wide and 80 in. long. Sections can be added to the tracing table so that any length can be covered. The welding speed is adjusted by a stepless speed control on the tracing machine. Standard or high speed tracing heads permit welds at speeds from 4 to 40, or 11 to 100 in. per minute.

MS-9—Manual Arc Welding Electrode

Introduced by North American Philips Co., Inc., N. Y. C., and to be displayed for the first time at the National Metal Exposition in Philadelphia, Oct. 25 to 29, is a new type manual arc welding electrode available in lime ferritic, iron oxide and organic types, having a special coating. These new type Norelco contact welding electrodes, two of which can also be used on a semi-automatic basis, permit touchwelding in all welding positions except vertical up, and have automatic starting and re-igniting properties, with claimed deposition rates from 25 per cent to 100 per cent higher than those of standard type electrodes.

The electrodes are said to work satisfactorily with standard welding equipment on AC or DC reverse or straight polarity. Currents up to 600 amp for the 5/16 in. size may be used.

New Products at the Metal Show

For additional information regarding any of these items, please use coupon on page 68

MS-10—Lightweight Aluminum Wrench

Frontier aluminum pipe wrench

A sturdy new aluminum pipe wrench claimed to meet highest specifications for usage, yet weighing less than half as much as the ordinary-type wrench will be displayed at the Metal Show by the Frontier Bronze Corp., Niagara Falls, N. Y.

Newest successful application of Frontier 40-E (non-heat-treated) aluminum alloy, this cast wrench in the 18 in. size weighs only 40 per cent as much as a pipe wrench of forged steel.

It has been repeatedly shown by test to withstand a pressure of 13,500 in. lb—the pressure designated in Government Specifications GGGW-651A (standard Federal specification for pipe wrenches). This is the equivalent of 900 lbs of load pressure applied 15 in. from the wrench jaws.

MS-11—High-Frequency Heating Units

Completely redesigned Lepel high-frequency heating units, including a new, all-steel construction of frame, base and panels, have been brought out by Lepel High Frequency Laboratories,

(*Turn to page* 51, *please*)

Lepel high-frequency heating unit

AIRBRIEFS

By ROBERT McLARREN

See-Saw Battle

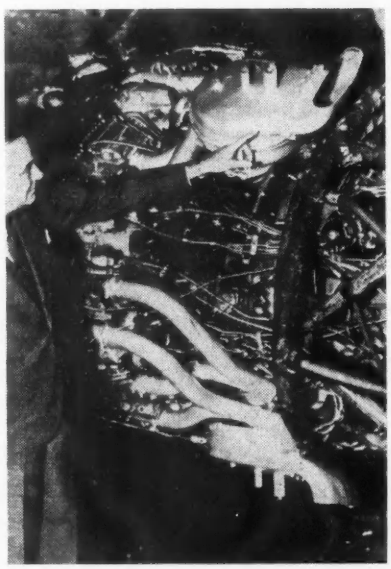
The classic race between the engine and airframe industries, which has oscillated between engines too powerful for existing airframes and airframes penalized by lack of adequate power plants, has now swung back to the latter situation following five years of engine leadership. The jet engine was long hailed as the power plant airframe designers would take years to catch up with. But many airframes are now ready for bigger jet engines with few in sight. The North American F-86A fighter has cinched the case for it represents an airframe which can go much faster than its engine can push it. Now holder of an official world's speed record of 670.981 mph, the swept-wing combat airplane is limited in speed only by the 5000 to 6000 lb thrust of its General Electric J-47 (TG-190) power plant, the most powerful now in production in the U. S. Turbojet designers have told us repeatedly that they could produce an engine of any given power by a simple scaling-up process upon request. The swept wing, which is now a fashionable configuration (McDonnell XF-85 and XF-88, N.A.A. F-86A, Northrop X-4, etc.), has pushed the airframe well into the transonic speed regime without the power to fly there, unless short-period rockets are used. The jet engine industry's turn has now come!

Wright Field to Stay

A rumor good any season is that Wright Field is due for abandonment. The venerable Air Force development center, now officially termed Wright-Patterson Air Force Base, has been claimed frequently to have outlived its usefulness. Major argument is that its tremendous power requirements (for wind tunnels and laboratories) have outgrown comfortably available power resources in the Dayton, Ohio, area. (Wright Field has operated many items of equipment only during the midnight-to-dawn hours for this reason for several years.) Now, however, Air Force has spiked the rumor again with plans for further construction at the Field, including new buildings for a photo research and processing laboratory, new quarters for the Air Force Institute of Technology, a rotary-wing testing facility, a firing-test facility for the armament laboratory, a scavenging building for the 10-ft. wind tunnel (to remove exhaust from engines operated during the tests), an electrical whirlrig (for testing pilot acceleration reactions), a weight-and-balance hanger, a rocket-test facility, two extra-large hangers (for very, very heavy bombers) and heavy aprons alongside the new runway to accommodate VVHB aircraft! Assuredly, the Air Force doesn't plan any abandonment of Wright Field for many, many years to come!

Compound Engine

Wright Aeronautical Co.'s Wright Turbo-Cyclone 18 compound engine has at last been brought out from its wraps and a $32,000,000 Navy contract for the type announced. Wright's approach to the problem of gearing an exhaust driven gas turbine back into the engine was to use three small turbines rather than a single large one. The turbines are at 120 degrees from each other with their axis normal to the crankshaft axis and quill shafts used to carry the torque into the shaft. The turbines are mounted on the standard Wright R-3350 double-row radial air-cooled design and will give the engine a 20 per cent reduction in fuel consumption. Although of secondary importance design-wise, the turbines also are expected to give about a 15 per cent improvement in engine power, raising the engine up towards the 3000 hp mark. Navy will install the engine in its Lockheed P2V patrol plane (already world's long distance record-holder at 11,236 miles), its Douglas AD Sky Raider single-engine single-seat bomber and the huge Lockheed XR60 Constitution transport as a starter. Air Force has not yet announced its Pratt & Whitney Wasp Major compound engine but has already ordered a substantial quantity. First installation will be in the Boeing B-54, a compound engine version of the B-50 bomber.



President Guy Vaughan of Wright Aeronautical Corp. points to one of the three turbines between the two rows of cylinders on the new Wright Turbo-Cyclone compound engine (see Compound Engine) (Acme photo).

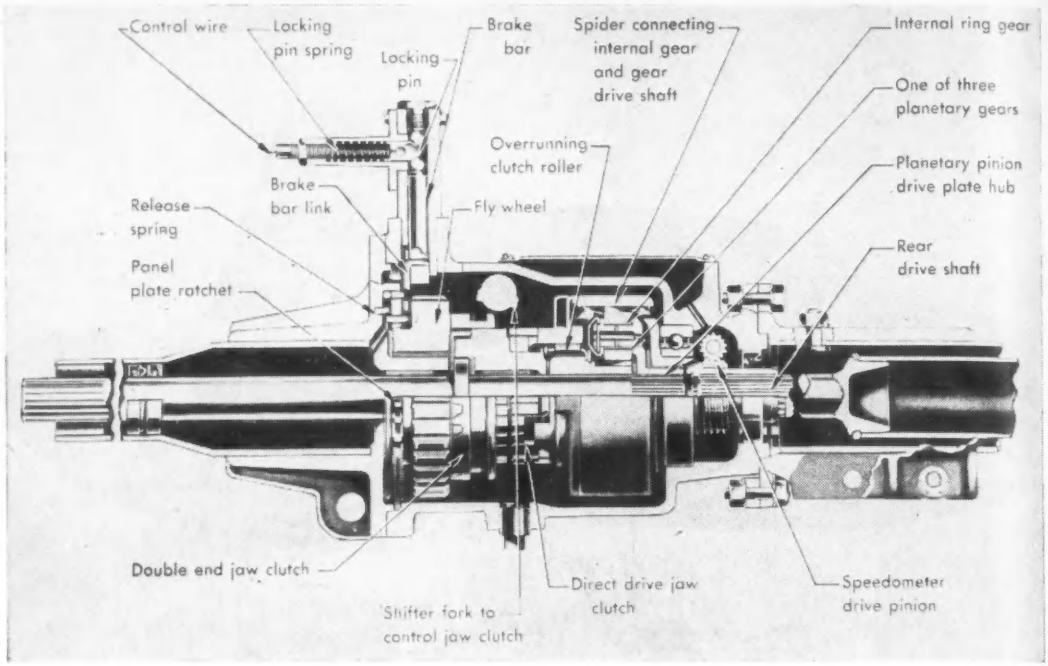
British Leadership

While Britain's nationalized air transport system continues to gyrate deeper into its snarl, the still-free and therefore enterprising British aircraft industry continues its leadership in gas turbine development. England now has flown a two-jet and four-jet transport plane and one (and perhaps two—as you read this) four-turboprop transport plane. The Vickers Viking two-jet transport has been flying for some time but the recent Farnborough air show, sponsored by the Society of British Aircraft Constructors, featured the Avro Tudor VIII powered by four Rolls-Royce Nene turbojet engines in a flight demonstration. The engines are mounted in two Siamese nacelles lying below the wing. Vickers-Armstrong Viscount, powered by four Rolls-Royce Dart turboprop engines, flew before the crowds and staked its claim unequivocally as the world's first multi-turboprop airliner. Just missing the show (and perhaps flown as you read this) was the Armstrong-Whitworth Apollo, similarly powered. And as if these actual flight test successes were not enough, news comes of more turboprop engines on the way: the 1500 hp Napier Naiad, 2200 hp Bristol Theseus, 3200 hp Bristol Proteus and 3670 hp Armstrong-Siddeley Python, all except the Proteus of which have been actually test flown. This at a time when only our approximately 2000 hp General Electric TG-100 turboprop has been flight tested and proved unsuccessful. Here's another field challenging our engine industry.

Cab Gets Tough

Persistent airline operating losses accompanied by equally persistent demands upon the Civil Aeronautics Board for increased government pay has made the five-man quasi-judicial body adopt a "get tough" attitude in its deliberations. First to feel the brunt of this new temper is George T. Baker's National Airlines, which has been strike-bound since February and has hung up increasing deficits since that time. The CAB began hearings Dec. 1 on the advisability of literally dismembering the airline by awarding its New York-Miami route to Pan American (which has long sought a domestic route), its New Orleans-Jacksonville and New Orleans-Miami routes to Delta

(*Turn to page 76, please*)



Cutaway view of Truckstell Tip-Toe Matic overdrive unit showing relation of various elements. The locking pin and brake bar are shown displaced in the drawing for clarity, since they are horizontal and in front of the drawing in their normal position.

The Insides of the

New Truckstell Overdrive

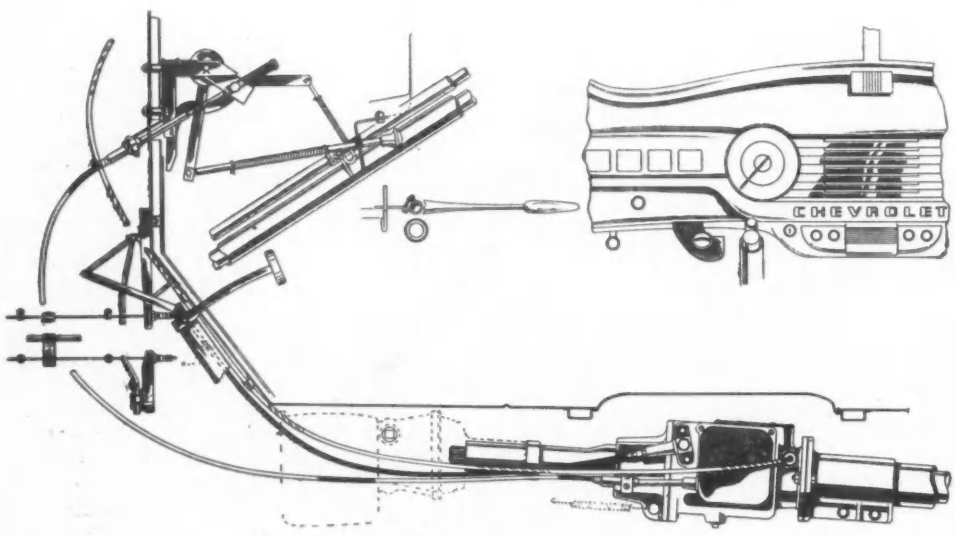
AN ALL-MECHANICAL overdrive that operates in all forward speeds, eliminates free wheeling in any speed, and incorporates a hill holder, has been announced for Chevrolet cars by the Truckstell Manufacturing Co. Known as the Tip-Toe-Matic, it can be installed on all models except station wagons and convertibles which have cross braced frames.

To install the overdrive, it is necessary to cut off the torque tube so as to allow room for the installation of the unit. A new front torque tube and drive shaft, also the new shorter rear propeller shaft are furnished as part of the overdrive. The rear end of the unit housing is clamped to the shortened torque tube.

Shifting into the overdrive is entirely automatic, once the control has been set. This is accomplished by depressing the clutch and pulling out the overdrive knob to the left of the steering column. This sets the automatic control. To return to standard direct drive with overdrive locked out, the driver has only to depress the clutch and push the overdrive knob in to unlatch the control. Control is by means of an enclosed flexible steel wire.

There are two methods of control which shift the car back to direct drive with the car remaining in the overdrive range — full depression of the accelerator pedal will do it. or a

(*Turn to p. 90, please*)



Diagrammatic view of Truckstell overdrive equipment as installed in a Chevrolet.

(*Continued from page* 48)

Inc., N. Y. C., available in 7½, 15 and 30-kilowatt ratings. The units are to be displayed at the Metal show in Phila.

In addition to a completely modernized appearance, unit interiors are reported to be of the latest fire-resisting materials. Other changes include improvements in the spark gap holders, thus reducing need for adjustment of spark gaps; and the use of fibre glass insulation in the high-voltage side of the main transformer.

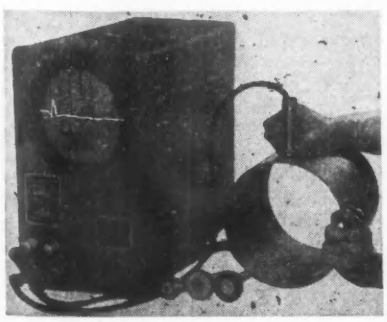
Applicable for high-frequency heating on ferrous or non-ferrous materials, the heating units are claimed flexible in work, without requiring any auxiliary equipment for hardening, annealing, stress relieving, brazing, soldering and melting. The units can also be used with a large variety of work coils for heating parts of widely different sizes and shapes, without requiring matching transformers or condensers.

These high-frequency heating units, according to the manufacturer, give full power output, as they deliver their full rated capacity when treating both non-ferrous and ferrous metals. Power is claimed not to drop off, for example, when the metal being heated passes from magnetic to non-magnetic stage, or from solid to liquid state. Units consume current only during the actual heating cycle.

MS-12—Inspection and Measuring Units

Magnaflux Corp., Chicago, Ill., has perfected an entirely new method of magnetizing parts in several directions at the same time which will be employed in a new line of Magnaflux Duovec inspection units. To be first presented and demonstrated at their Metal Show booth, this method permits parts to be inspected for defects in any direction with one magnetizing operation and one visual inspection operation instead of the usual two or more magnetizations and inspections required in the past.

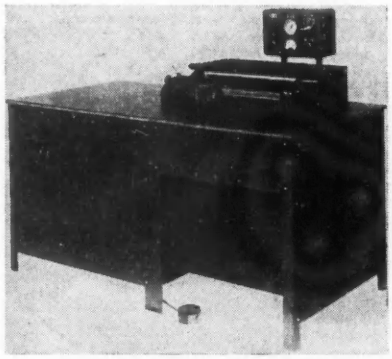
The new Duovec system comprises the application of two magnetizing forces simultaneously. The parts are placed between the heads on the unit, where they receive magnetization in both directions during one shot while the inspection bath is being applied.



Magnaflux Sonizon, ultra-sonic precision instrument

New Products at the Metal Show

For additional information regarding any of these items, please use coupon on page 68



Magnaflux Type MV DUOVEC unit using "swinging field" magnetization

The type MV is one typical unit of the Magnaflux Duovec type. In the MV unit, a current is passed through the part as in normal circular magnetization. At the same time the part is subjected to a longitudinal field of regularly changing strength. The resultant varying magnetizing force swings through an angle within the piece of considerably more than 90 deg and thus cuts across all possible defects at right angles, as is required for best adherence of magnetic particles to form indications of the defects which can be easily seen.

In these units the swing of the field may be adjusted from 0 deg swing to well over 90 deg, by changing the relation of values between the circular and longitudinal magnetizing fields. This type of magnetization is used with the fluorescent Magnaglo particles as well as the usual wet Magnaflux visible particles to obtain indications of defects in the parts.

Inspection with the new Magnaflux Duovec is at present most applicable to the smaller parts which are substantially uniform in cross-section and are of essentially cylindrical or bar shape. This includes many parts made and inspected in high volume such as bolts, wrist pins, roller bearings, small gears, camshafts, etc.

The company will also demonstrate its new Magnaflux Sonizon, ultra-sonic instrument for measurement of thickness and location of defects from one side only. The Sonizon operates automatically on the ultra-sonic thickness resonance principle to furnish a direct thickness reading on the calibrated face of a cathode ray tube. Thickness readings cover ranges from 0.010 in. to 4 inches, claimed accurate within 2 per cent, and read immediately as the probe is placed in contact with the work.

MS-13—Water-Soluble Carburizers

E. F. Houghton & Co., Phila., Pa., at the National Metal Exposition in Philadelphia's Convention Hall, Oct. 25-29, 1948, will demonstrate water-soluble carburizers with particular emphasis on Perliton "W," the latest carburizing salt. It is completely and quickly soluble in hot water.

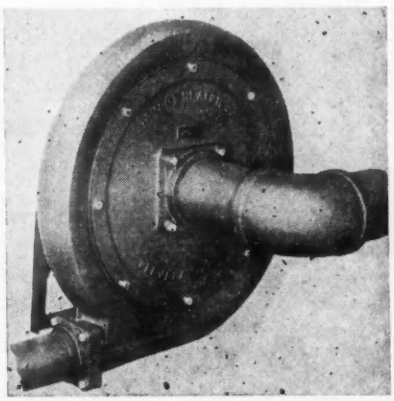
Houghton representatives will also demonstrate their new product, Anti-Sep All-Purpose Base, designed for use as either a straight or a cutting oil, and Houghto-Solv, their newest fuel oil additive.

MS-14—Sawing Machines and Sharpeners

At the A.S.M. Exposition, Phila., Motch & Merryweather Machinery Co., Cleveland, Ohio, will exhibit three of their circular sawing machines and two automatic saw sharpeners, together with a range of triple-chip segmental saw blades for larger work and solid saw blades for smaller work. The new M&M automatic transfer machines will be in operation, as will the new No. "O" Model for work up to 4 in. diam.

MS-15—Gas Pressure Boosters

Hi-Flo gas boosters, produced by the Bryant Heater Co., Cleveland, Ohio, are centrifugal pumps for handling various types of clean gases. Their construction utilizes light weight cast aluminum housings, side plates and bases which reduces possibility of static sparks. A cadmium plated, steel impeller of simplified design, mounted on a special motor shaft extension with enclosed seal, completes the unit.



Bryant Hi-Flo gas booster

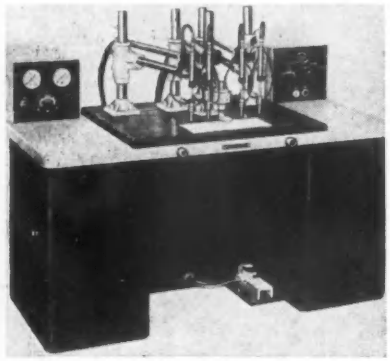
NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 68

M-88—Metal and Alloy Welder

A new stud welding process announced by the Graham Mfg. Corp., Detroit, Mich., welds metals and alloys of steel, stainless steel, monel, aluminum, magnesium, zinc, copper, and in some cases, combinations of these metals and alloys.

The basic principle of the Graham welder is a capacitor-operated, self-timed device using tip studs which, on coming in contact with the work and fusing, causes ionization. This in turn, allows a path for the main discharge current of the capacitor to form an arc sufficient to melt both the full diameter of the stud end and the work piece directly underneath. The necessary hammer blow which follows causes the pieces to weld. This complete cycle is brought about by a rapid, continuous movement of the stud-holding part, no retarding means being employed. The time of arc is about one mil second, permitting use of very high currents.



Graham stud welder

This short arc time concentrates the heat, permits welding of studs on very thin metal, causes no fillets, or distortion of work, or discernible heat, allows the studs to be welded on the back of plated or painted surfaces without marring, and requires no flux.

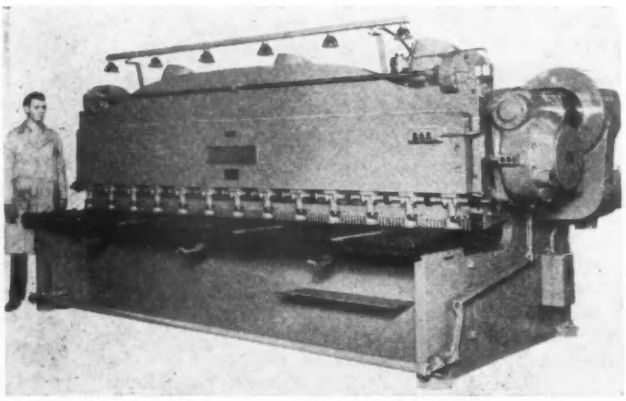
Stud dimensions are up to ½ in.; current rating is AC 110-220-440 three phase; welding pressures are mechanical or pneumatic. No auxiliary cooling means are necessary. The machine illustrated provides for guns to be used as two-operator set up, or used in gangs for one operator.

M-89—Low Rake Steel Shear

This All Steel Shear produced by the Cincinnati Shaper Co., Cincinnati, Ohio, has a capacity of ¼ in. of mild steel 12 ft long. It features very low rake or shear angle to the upper knife, of utmost importance to insured sheared strip with a minimum of twist, bow, or camber. Shears with special low rake such as the one illustrated are capable of shearing 10 gage strips, ¼ in. wide, 10 ft long without twist.

A shear of this type is said to effect considerable savings by converting sheet stock to strips which are accurate and true for forming, punching, drawing or other operations. Strip stcok if purchased costs several times that of sheet stock, and it is claimed, the savings from the conversion will pay for the cost of the shear in a relatively short period.

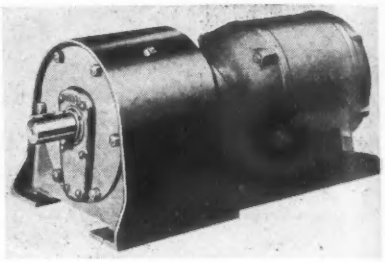
Another feature illustrated is the new Cincinnati light beam shearing gage. Light intensity by ten times through the use of the new General Electric projector floor lamps. The light beam shearing gage is useful when shearing to a scribbled line in the production and other irregular shapes.



Cincinnati all steel shear

M-90—All Steel Motor Reducers

The Falk Corp., Milwaukee, Wis., is offering a new line of all-steel motoreducers used to drive mixers, agitators, conveyors, pumps, dust collectors, screens, classifiers, shot blast machinery, vats, fans, washers, foundry equipment, line shafts, machine tools, various types of mill and other equipment.

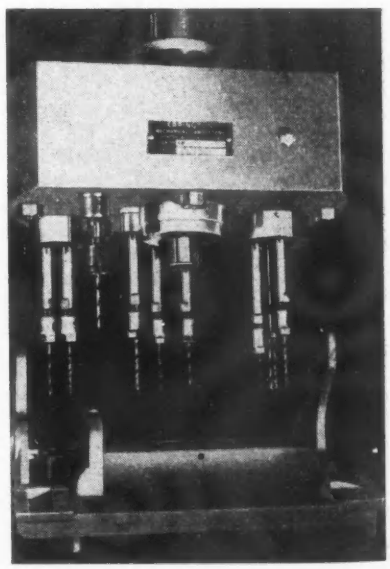


Falk motor reducer

The complete line includes horizontal and vertical units in both Integral and All-Motor types for floor, wall or ceiling mount. The basic Motoreducer unit can be converted to right angle, V-belt, multi-speed, low ratio, ceiling mount and many other adaptations.

The new all-steel housing is designed with smooth contours and generous sections, and equipped with a newly developed dirt-proof and moisture-proof seal which protects gears and bearings. Increased shaft diameters provide greater strength and overhung load capacity.

M-91—Multiple Drilling Head



Errington ten spindle multiple drilling head

Errington Mechanical Laboratory, Inc., Staten Island, N. Y., announces the new Errington ten spindle multiple drilling head, drilling ten various size

holes on different elevations. The head has grooved thrust ball bearings at all thrust points and hardened bronze radial bearings. Heat treated spindles and gears of one piece are turned from solid bar stock. It is geared approximately 2:1. All are enclosed in a sand-cast aluminum case and cover, with alemite pressure lubrication.

M-92—Huge Die Casting Machine

What is claimed as the world's largest standard die casting machine has just been introduced by the Kux Machine Co., Chicago, Ill.

Available in three models, this machine having 800 tons locking pressure will form castings in zinc weighing up to 30 lb and in a aluminum weighing up to 10 lb. Extremely high injection pressures are utilized reaching as much as 40,000 lb per sq in.

Having a die space of 40 in. by 25 in. between the tie bars and 17½ in. of die separation, very large dies can be accommodated and castings having a deep draw are easily produced.

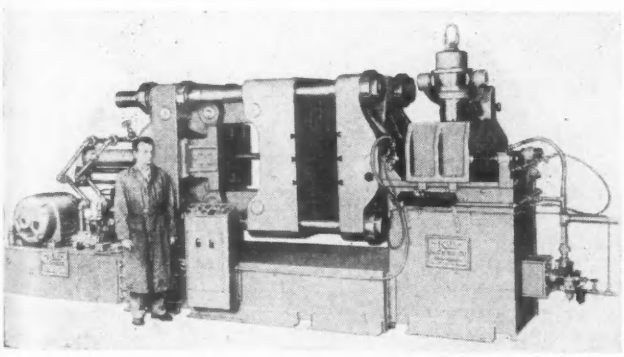
Completely hydraulically operated and electrically controlled, movement of electric push buttons is all that is required for a complete die casting cycle. Speed of operation is practically the same as on smaller machines with an average of 3 to 4 zinc castings cycles or 2 aluminum casting cycles per minute being possible.

As a gooseneck plunger type machine, Model BH-40 will produce zinc, lead or tin die castings, and has its self-contained melting pot and furnace incorporated within the frame of the machine. For production of aluminum, magnesium or brass castings, the machine, Model No. HP-40, has a cold chamber hand ladling injection unit.

Constructed as a convertible machine, Model BH-40C uses a gooseneck plunger mechanism for zinc castings and a cold chamber hand ladling unit for aluminum with conversion from one style of die casting to the other requiring a minimum of change over time.

Massively constructed throughout, this machine has cast steel die plates and toggle links with heattreated alloy steel used for the 6 in. tie bars, toggle pins and other pressure members. The two way double locking toggle will safely withstand its rated 800 tons holding pressure thus keeping casting flash at a minimum. Automatic casting injection is built into the machine and ejector pins are automatically returned, as well, before the die plates close, preventing interference with side core pins.

The new Kux injection pressure multiplier is also part of the machines, and this unit, by multiplying the ending pressure 2 to 1 over the starting pressure, packs the metal into the die assuring solid, dense casting production.



Kux die casting machine

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 68

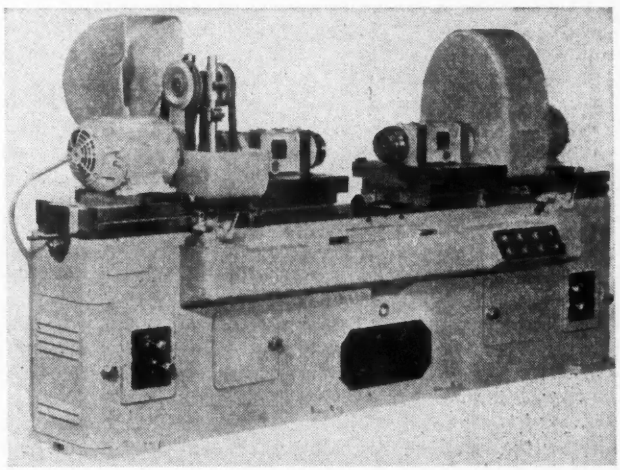
Hobart high frequency stabilizer for AC or DC welders

M-93—High Frequency Stabilizer

A new product of The Hobart Brothers Co., Troy, Ohio, is a high frequency stabilizer, designed for use with ordinary AC or DC welders in inert-gas-shielded tungsten electrode welding; in sheet metal work and other applications involving low currents; in vertical and overhead welding; and with the twin carbon arc torch. Especially developed to adapt ordinary AC transformer welders for "Heliarc" welding, the unit increases the impulses from 120 per second to 4,000,000 impulses per second. An intensity control is provided so that the intensity of the high frequency can be adjusted to suit the particular job at hand. It is available in two sizes with maximum capacities of 300 to 500 amperes respectively.

M-94—Sealed Lube Boring Machine

The Simplex Machine Tool Division of Stokerunit Corp., Milwaukee, Wis., has recently placed a completely new precision boring machine in production. Known as Model 2UA, it incorporates a new sealed lubrication system in the precision boring heads, eliminating the entrance of foreign matter and resulting in much cooler operation. New coolant troughs give adequate protection even when the operation calls for flooding the part with coolant, it is said.



Simplex model 2UA boring machine

The unit type hydraulic systems which isolate vibration and heat from the machine proper have been retained as a time-proven feature. All hydraulic piping is manifolded to facilitate the easy removal of the entire hydraulic systems for cleaning and servicing.

(*Turn to page 55, please*)

Security Board Places Standby Order for 100,000 Machine Tools

By Eugene J. Hardy
Washington Bureau
AUTOMOTIVE INDUSTRIES

WITH stand-by pool orders for 100,000 machine tools now in the hands of the machine tool industry the National Security Resources Board is moving ahead with plans to include many other types of production equipment in its program of preparation for any future M-Day. Considering plant equipment, including machine tools, as the first emergency requirement, with initial demand as great as in World War II, NSRB naturally is concentrating on commodities of this type in the initial stages of the preparedness program. However, it is expected that many other standard types of equipment will be blanketed in the stand-by order program, including such things as electric motors, standard steel shapes, and even consumer products such as shoes.

Basic objective of the plan, worked out by Major General S. E. Reimel and E. R. Henning, director and assistant director of NSRB's Machine Tool Division, is to have the advance paper work out of the way in the event of future emergency. Once the stand-by order is placed the manufacturer can begin to plan for getting into production on M-Day. This advance planning will also eliminate the mad rush to Washington on the part of industry should war break out. Military planners consider this aspect vitally important, since it is considered very likely that Washington and other important cities may be the object of immediate attack in the event of war, which would not permit the gradual evolution of administrative and control measures.

Come M-Day, the stand-by orders will be made effective by notification from some government agency, probably the Reconstruction Finance Corporation, since this is the only government body possessing funds which may be used immediately for emergency purposes. The government will not undertake to purchase the commodities covered by the orders, but it will guarantee to purchase anything that cannot be sold.

Pattern for Additional Plans

The 100,000 machine tool program is serving as a pattern for additional plans now in the works. Now under discussion at NSRB are stand-by orders for the following types of plant equipment: metal forming and shaping machines, cutting tools, gauges and precision measuring tools, light power and hand tools, portable electric and pneumatic tools, abrasive products, foundry equipment and supplies and metal-melting furnaces, industrial heat-treating furnaces and ovens, cranes and hoists, monorail systems and chains.

The machine tool program got underway with a survey of plant capacity in some 300 plants. This survey, conducted by the Department of Commerce, gave NSRB the basic data on which to form a program for stand-by orders. It was found that the machine tool industry is currently operating at an annual volume of about $300,000,000. Its present capacity is estimated at twice that figure, based on a single shift 40-hour week. This existing capacity is considerably in excess of hitherto peacetime levels. There are installed approximately 1,775,000 units of metal working machinery in the United States, upwards of 700,000 more than in 1940, according to NSRB. In addition, or set aside for reserve, there are in government storage upwards of 90,000 tools.

In addition to the individual tools in the reserve, 151 complete plants have been retained by the Military Establishment, some in operation, others in stand-by readiness. Of the plants not retained by the Military Establishment, 242 have been released for disposal with a National Security Clause or other restriction requiring the plant and its equipment to be held in such state that reconversion to war production can be readily accomplished.

From these aspects, NSRB found "the position favorable, compared to 1940." It was on this group of basic facts that the stand-by order plan was based. Discussions were held with the military agencies, other interested government departments, and the industry. A tentative assignment of orders was made on the basis of plant capacity without necessitating undue expansion and comment on this tentative plan was received from the industry. Actual stand-by orders were then issued.

Necessary Forms with Stand-by Orders

These orders are complete with all necessary forms, requiring the minimum of administrative action to put them into effect in an emergency. To avoid the overproduction of accessories, as occurred in World War II, standard accessories have been limited. The stand-by pool orders will be reviewed at least once a year to assure that they conform to any changes in arms programs in the war plans, or radical changes in machine tool builders' capacities.

NSRB makes it clear that the figure of 100,000 tools is not related to requirements, which cannot be forecast in exact figures. However, it is believed to be of a magnitude sufficient to start the machine tool industry toward maximum production without waiting for firm orders from arms producers.

NSRB feels that the "more important consideration is not the exact magnitude of the pool orders, but the distribution of types and sizes necessary to produce the character of munitions that latest war plans envisage." The orders for machine tools emphasize types that are likely to be short in the event of war, based largely on World War II experiences. It is estimated that the orders now placed will save the machine tool industry from five months to a year in any future emergency.

Other major conclusions reached by NSRB in its machine tool study are as follows: the industry could promptly double existing production, working a single shift 40-hour week, provided materials and labor were available; the industry would not require substantial amounts of tools to attain full war capacity; increase of plant would not be large, less, it is estimated, than 25 per cent of World War II plant expansion; reserve plants inspected, in contra-distinction to reserve tools, indicated a very satisfactory degree of readiness to resume war production; for the current air program, the tool requirements should not overtax the industry — technological problems of machining, rather than tools themselves, constitute the basic problem in the air program.

With the machine tool program being used as a pattern for similar plans for other segments of the metalworking industry its importance cannot be overemphasized. In addition to the stand-by order phase of the program, other recommendations, now being put into effect, including preparation of emergency control legislation, are also of major importance.

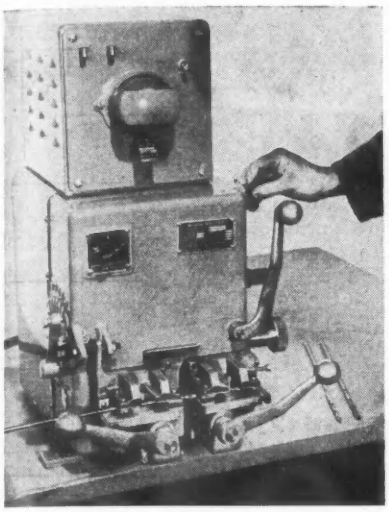
Inventory of Reserve Tools

For example, reserve tools are being inventoried and a standard system, based on the Standard Commodity Classification, is being set up. A central, standard, distribution plan is being developed for the rapid identification and

(*Turn to page 76, please*)

M-95—Production Flash Welder

A new production flash welder that will join band saw blades up to 2 in.



Model DBW-5 DoALL flash welder

in width is announced by the DoALL Co., Des Plaines, Ill. The unit, equipped with special inserts, will also join wire, drill rod, bars, flat stock, up to 5/16 in. in dia, making it useful for salvaging broken tools, welding extensions on drills, reamers, taps, grinding wheels, joining coils or rings, etc.

The weld cycle is motor controlled and fully automatic in this new flash welder Model DBW-5. Mechanical coordination of welding heat and pressure assures welds of uniform density and purity independent of the operator's experience.

A positive stop on the movable jaw travel prevents any possibility of the jaws making contact which would result in a burned-out transformer. Servicing all switches is simplified by removing only one panel. Selective annealing heats provide for variations in stock width and thickness. Welded jaws, made of a special alloy, prevent accumulation of flash metal.

The DBW-5 is equipped with a grinding unit for preparing material to be welded and to grind off flash after welding. A saw thickness gauge is included on the grinding units for dressing the weld to proper thickness. The welder will perform etching operations when an etching pencil is connected to the welding jaw, thus permitting marking or numbering of tools, dies, parts, etc. for identifications.

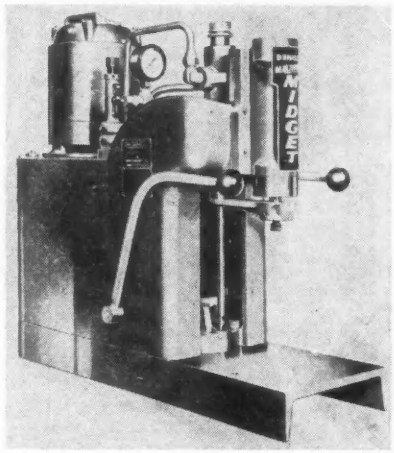
A lighter duty Model DBW-1 butt welder with capacity for welding saw blades up to ⅝ in. in width is also available for either bench or pedestal mounting. The operating panel is illuminated, and the unit is complete with annealing control, saw weld selector and a built-in grinder with blade thickness check gauge.

NEW
Production and Plant
EQUIPMENT

For additional information regarding any of these items, please use coupon on page 68

M-96—Packaged Oil Hydraulic Press

The Midget, a Multipress in a new packaged unit announced by the Deni-



Midget Multipress of the Denison Engineering Co.

son Engineering Co., Columbus, Ohio, offers a multi-purpose, oil-hydraulic press of 2000 lb capacity, complete with its own plumbing equipment. Measuring over-all 13 in. by 30 in. by 29¾ in., and weighing only 270 lb, the Midget can be easily moved anywhere in the shop. Its small size adapts it for use in batteries for successive operation requirements, with all units independently controlled. It can be adapted to other hydraulic machinery as an accessory unit, and may be operated in any position.

The oil-smooth HydroOILic action exerts the same exact, preset pressure selected for the work regardless of size variations in th parts. Ram stroke, ram speed and ram pressure are all regulated by controls at the operator's fingertips.

Unskilled operators turn out high, reject-free production. The operator must depress both levers before the ram will descend, insuring that hands are away from dangerous moving parts.

The Midget has a ram stroke of 6 in.; throat depth of 4⅝ in., and a daylight opening of up to 15⅝ in., with a ram speed of 600 ipm up and 400 ipm down.

M-97—Contour Measuring Machine

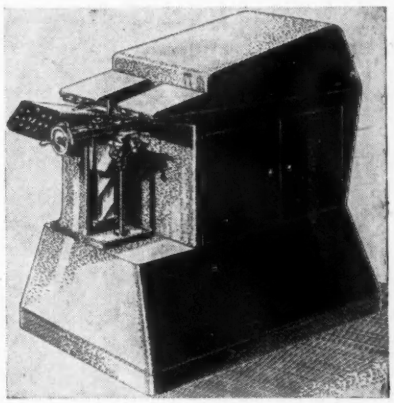
A contour measuring machine model SD-21 put out by Measuring Machines, Inc., Cleveland, Ohio, will mechanically measure within plus or minus 0.00025 in. across the width of a blade in increments of either 0.0125, 0.025 or 0.050 in. at a speed of approximately 0.375 in. per minute. It can also give a continuous trace outline of the blade contour at approximately 0.750 in. per minute and provide a permanent photographic dimensional record.

The machine is comprised of five major components: a precision three-dimensional table, a probe and tracer arm unit, a light beam and optical system, a photographic recording system and a control panel.

The basic dimensions of the table are: working surface, 18 by 2.75 inches; longitudinal travel, 9.25 inches; transverse travel, 3.625 inches and the vertical movement, 8.875 inches.

The probe and tracer arm unit consists of an aluminum frame in which are mounted two diamond pointed probes, operating in precision reciprocating bearings, two magnesium transfer arms operating on precision jewel staff bearings, two magnification rotors on which are mounted two special recording mirrors.

The light beam and optical system consists of a special scale light projector



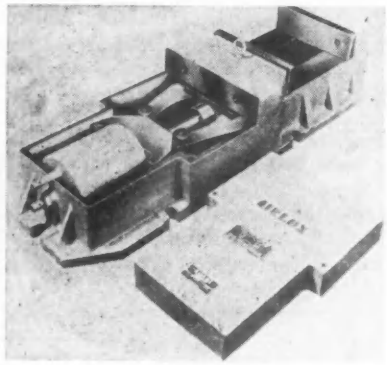
Model SD-21 contour measuring machine manufactured by Measuring Machines, Inc.

for progressively printing the vertical dimensional scale on the photographic paper. A print light operates through an optical system consisting of a group of special condensers and lenses for recording the dimensional contour of the part being inspected.

The photographic recording system consists of a controlled paper drive mechanism, a print light recording aperture and a special paper scale comb.

The control panel consists of a blade increment selector, manual and automatic control switches, all necessary safety lights, for automatically warning the operator of paper run-out, light run-out, over-run on the table travel, etc.

P-76—Pneumatic Vise



Airlox senior Model S-100 pneumatic vise manufactured by Production Devices, Inc.

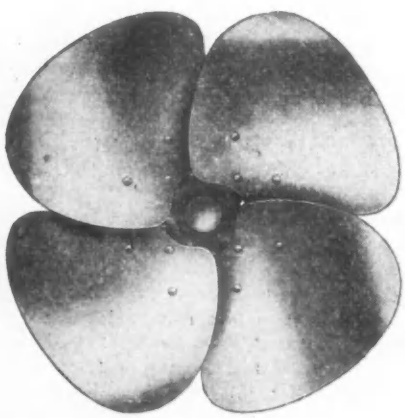
Designed primarily for production work holding on 40 to 50 hp milling machines, the new Airlox senior Model S-200 pneumatic vise has been added to the line of Production Devices, Inc., Whitehall, N. Y. Its gripping power ratio of 200 to 1 accommodates 100 lb of air pressure in the line in affording a grip of 10 tons to be exerted on the work. An airline pressure of 200 lb is said to be safe to use on the vise if that much jaw squeeze is desired.

Weight of the vise is approximately 575 lb, jaw width 10½ in., depth 3 in. Jaw hole spacing is given as ⅝ in. to 11 in. Jaw bolts are spaced 7¼ in. n centers, 1½ in. from hole center to vise bed. Movable jaw stroke is ⅝ in. maximum adjustable to 1/16 in. minimum, with maximum jaw opening 12 in. between castings.

P-77—New Formed Fan Blade

Soon available in production quantities from the Torrington Mfg. Co., Torrington, Conn., is their new "Hi-Eff" fan blade offered to manufacturers of air-moving equipment.

The Torrington line is presently available in three- or four-blade construction, ranging in diam from 10 in. through 20 in. and 8 in. through 20 in.

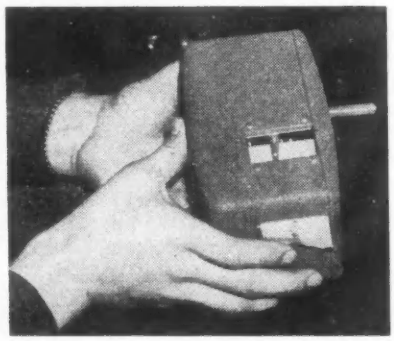


Torrington "Hi-Eff" fan blade

NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 68

P-78—Recording Vibrometer



G. E. recording vibrometer

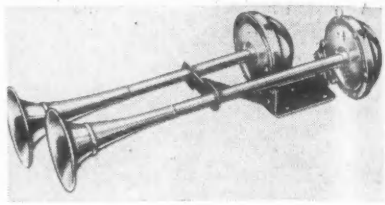
A new recording vibrometer which measures and records frequency, displacement, and wave shape of mechanical vibration, has been brought out by General Electric's Special Products Division, Schenectady, N. Y.

Built to operate either when mounted on a fixed base or held in the hands, the vibrometer weighs only 7 lb and is less than 8 in. in length. For testing all types of reciprocating and rotating machinery within a vibration frequency range of 10 to 120 cycles per second, it records vibrations both steady-state and transient.

A prod extending from one side of the vibrometer is set in motion when held against a vibrating body. This motion is amplified by a cross-spring arrangement and transmitted to a stylus which inklessly records the vibration on wax paper. Another stylus produces a timing mark near the edge of the wax paper every one-third of a second. Both the chart speed and the interval between timing marks are governed by a synchronous motor operated from a 115-volt, 60-cycle power supply. Two push buttons are provided to give chart speeds of 1 in. per second and 3 in. per second.

Motion of the stylus on the chart can be observed through a window in the top of the all-aluminum case. One side of the case can be removed easily, for rapid replacement of the wax paper roll when its 50 ft capacity is depleted.

P-79—All Electric Air Horn

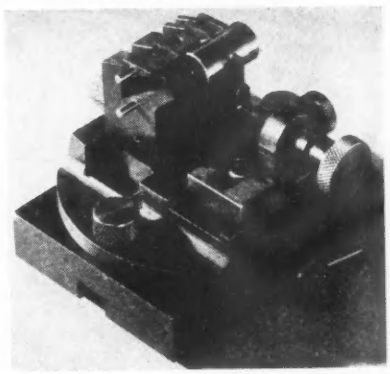


The "Tornado," Sparks-Withington's new all electric air horn

In answer to the demand for more powerful automotive warning signals, the automotive division of the Sparks-Withington Co., Jackson, Mich., has announced a new all electric air horn called the "Tornado."

This twin-trumpet horn, brass chromium plated and streamlined, is designed for easy inside or outside mounting on passenger cars, trucks or boats. It connects directly to the electrical system and requires no tanks, pipes or fittings to install. Motor "tapping" is not necessary, nor is any compressor needed.

P-80—Thread Staging Fixture



Universal thread staging fixture

A See-All thread staging fixture of a universal type for inspection by optical projection of screw threads ranging in diameter from 0.073 in. to 1.000 in. is a development offered by Engineers Specialties Div. of the Universal Engraving and Colorplate Co., Inc., Buffalo, N. Y., Although the fixture was designed for use on AO optical projection comparators, Kodak contour projectors, Jones and Lamson optical comparators, and Model P.25 Portman comparators, adapters available suit it for Bausch and Lomb contour projectors and other vertical type comparators as well.

The fixture provides fast methods of loading and holding screw threads. When used with the ESD co-ordinated thread chart-gage screens, the pitch diameter, major diameter, minor diameter crest, flank angle, worn tool allowance and lead of any screw thread from 0.073 in. to 1.000 in. O. D. can be gaged.

It provides simple helix angle adjustment for use on optical compara-

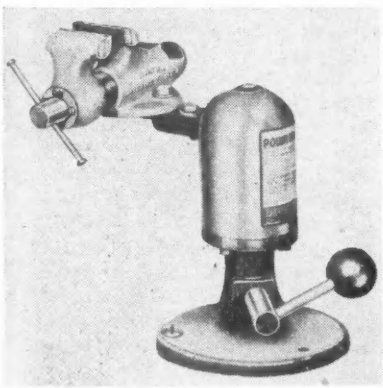
tors having no work stage with helix adjustment. Two sets of adjustable Vee assemblies are supplied; one set for the machine screw sizes from 0.073 to 0.216 O. D. and the other for the fractional sizes from 0.250 to 1.000 O. D. The Vee assembly is clamped to the base fixture by a lock screw. The two assemblies are interchangeable. For proper positioning of the jaws of the Vee assembly, two pins are provided, one in the upper and one in the lower half of the Vee. The distance between these pins is specified for each size of screw on a data table supplied. With the aid of a micrometer the pins are spaced to the proper dimension and the jaws are thereby brought into alignment for holding the screw to be inspected. The centerline axis of the screw is automatically established when using the Vee block method.

A set of twenty-five setting masters is supplied with the staging fixture for alignment of the fixture with the co-ordinated thread charts on the comparator. Nineteen of the set masters are for use with ANF Threads and six are for tapered threads. Tapered threads in sizes 1/16-27 to ¾-14 can be inspected.

P-81—Improved Hydraulic Powrarm

The Wilton Tool Mfg. Co., Chicago, is now producing two improved model Powrarm units, one mechanically operated for light work, the other hydraulically operated for heavy duty work. Both Powrarms position work at any desired angle on a 360 deg horizontal or axial plans, or on a 180 deg vertical plane, and hold the work firm under great pressures. The tools combine the ball-and-socket joint principle with a simple, positive locking device that requires only slight pressure on a lever or hydraulic system to lock the work in any position. Work up to 150 lb in weight can be held. Both Powrarm models easily bolt to a work bench, and a clamp is also available for attaching to other locations.

The Powrarm enables the mechanic to tilt work instantly to the angle best suited for convenience and accuracy. It leaves both hands free, and eliminates awkward unnatural positions that cause worker fatigue.



Wilton improved Powrarm

NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 68

P-82—Four New Caterpillar Diesels

Four new Caterpillar Diesel engines, each with a bore and stroke of 5¾ by 8 in. and a full load speed range of 800 to 1200 rpm, are tabbed for volume production at the Peoria plant of Caterpillar Tractor Co. before the first of the year.

Of eight-cylinder and 12-cylinder design with a 60 deg "V" arrangement, the newcomers offer more power than any current model, the most powerful of the four having maximum rating of 500 hp.

The engines will be available as industrial power units, electric sets and completely marined engines and augment the present line of six models of engines—the largest of which, the Caterpillar Diesel D17000, has a maximum output of 190 hp at 100 rpm.

The four were unveiled to the public by Caterpillar along with a Diesel engine of 225 hp at 2000 rpm governed full speed integral with the new Caterpillar Diesel DW21 and DW20 wheel-type tractors.

The four stationary power units include:

The Caterpillar Diesel D397 Engine, a V12 engine with blower, with a maximum output of 500 hp, a rated output of 430 hp and a continuous output of 400 hp.

The Caterpillar Diesel D386 Engine, a V12 engine, with a maximum output of 400 hp, a rated output of 360 hp and a continuous output of 320 hp.

The Caterpillar Diesel D375 engine, a V8 engine with blower, with a maximum output of 334 hp, a rated output of 300 hp and a continuous output of 268 hp.

The Caterpillar Diesel D364 engine, a V8 engine, with a maximum output of 267 hp, a rated output of 240 hp and a continuous output of 214 hp.

The four engines are designed to permit 100 per cent power takeoff at either end of the engine. Interchangeability of parts between engines of like number of cylinders offers additional advantages.

P-83—New Type Automobile Clock

The Delco Appliance Division, General Motors Corp., Rochester, N. Y., make the first formal announcement of a new type automobile clock based on an entirely new principle in the field of clock manufacturing.

In the new clock the balance wheel is used only to maintain an extremely accurate and uniform beat. An armature drives the clock mechanism and its impulses are regulated by an electrical circuit controlled by the balance wheel; no mechanical connection being necessary. The clock itself consists of four major components: (1) the balance wheel assembly, (2) the contact assembly, (3) the coil and driving armature assembly, (4) the reduction gear assembly.

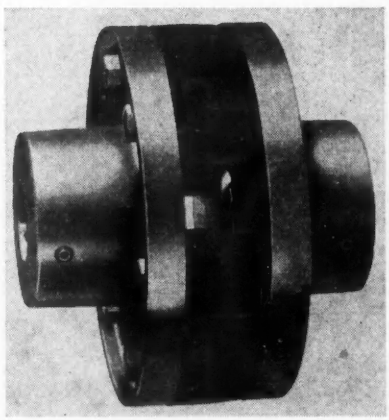
Each major part is built as a separate sub-assembly unit and all are mounted on a common base. Assembly of the four major units is done inside air conditioned dust free rooms. Balance wheels are checked with special equipment which is accurate to 0.000001 of an ounce inch. The clock is designed to operate at normal voltages present in automobiles.

P-84—Multiple H.P. Couplings

The Lord Mfg. Co., Erie, Pa., is putting out a new line of multiple H.P. couplings from 2 to 100 horsepower at 1750 rpm. The complete line is now available in 17 sizes from 1/50 to 100 horsepower at 1750 rpm.

Couplings of 1/50 to 15 horsepower have 15 deg torsional deflection under rated load. Sizes 30 to 100 horsepower have 3 deg. t is claimed that this high deflection gives unusual vibration isolation. Couplings accommodate at least 2 deg angular and 1/32 in. parallel misalignment.

Neoprene flexing elements operate in shear and are bonded to steel plates. Since there are no bearing surfaces to chafe, couplings are permanently quiet, require no lubrication, and are claimed unaffected by such abrasives as emery, sand, crushed rock or metal particles.

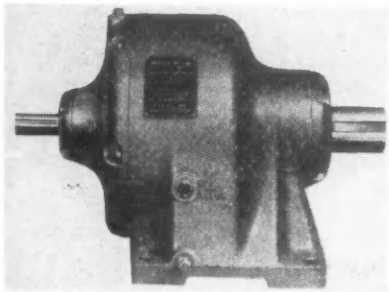


Lord multiple horsepower couplings

P-85—Helical Gear Speed Reducer

The helical gear-differential speed reducer now in production by the Winfield H. Smith Corp., Springfield, N. Y., features increased overhung load capacities.

Advantages cited are direct centered load distribution; more rigid, vibrationless mounting; larger area for heat radiation, and increased quietness of operation.



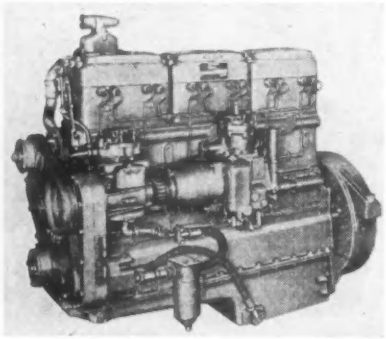
Helical gear differential speed reducer of the Winfield H. Smith Corp.

The gears of the differential helical gear reducer are made integral and combined in a planetary frame to form a complete unified planetary element. Constantly maintained smoothness of operation and equalized load distribution through all three sets of planetary gears result.

Ratios from 5 to 1 to as much as 50,000 to 1 can be provided with no increase in number of parts. Horsepower ranges from 0.62 to 81.5. Six sizes are available for every phase of industrial service, all with a streamlined compactness. They are made in horizontal, vertical and flange-mounted styles.

P-86—New Diesel Engine

A new Cummins Diesel engine, based on Model H and developing 10 per cent more horsepower, was placed in production last month by Cummins Engine Co., Inc., Columbus, Ind. The new Cummins Diesel, designated the HR-600 Engine, develops 165 hp (maximum) at 1800 rpm, with 5⅛ in. bore and 6 in. stroke. Piston displacement is 743 cu in. The HR-600 is four-stroke cycle and has the Cummins fuel system.



Cummins HR-600 Diesel engine

The new HR-600 is available in an automotive model, HRB-600; three industrial models, HRBI-600, HRI-600, and HRP-600, and a marine model, HRM-600. Model HRBI-600 is the basic industrial model, Model HRI-600 is equipped with instrument panel and trunnion support base, and Model HRP-600 is an enclosed power unit with structural steel base, clutch power take-off, radiator, fan, engine hood and fuel tank.

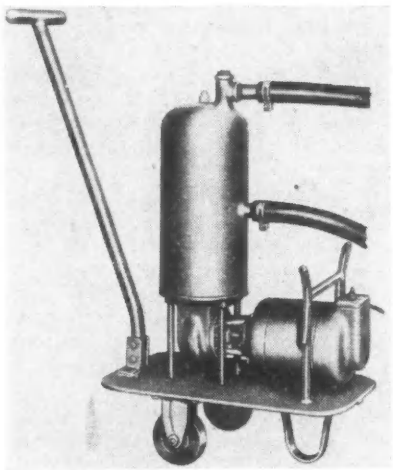
Field conversion to HR-600 from H-600 (4⅞ in. bore by 6 in. stroke) can be made by Cummins dealers. Steps involved include boring the present block and installing HR-600 pistons and liners and the optional installation of the new increased-flow lubricating system and continuous groove bearings.

NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 68

P-87—Centrifugal Portable Pump

A recently designed portable pump unit designed for transfer of liquids and for rapid removal of coolants from machine tool reservoirs and sumps is offered by the Ruthman Machinery Co., Cincinnati, Ohio.



Ruthman Machinery Co.'s portable centrifugal pump

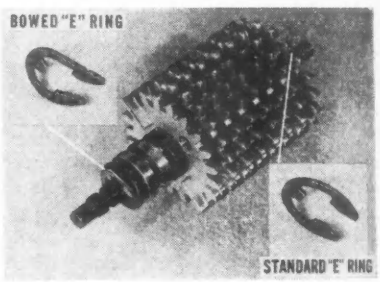
The unit consists of a centrifugal pump, Rumaco Model 4C, having internal discharge features, installed in combination with a shell type reprime chamber, with direct communicating discharge and inlet. The pump is mounted on a fabricated steel truck which has generous size rubber tired casters so that it can be removed both quietly and quickly.

The unit is provided with a ¾ hp motor, 3450 rpm, available in standard voltages and current characteristics. Capacity is 40 GPM at 15 ft and 50 GPM at 3 ft.

P-88—Bowed Retaining Rings

An improved method of assembly, assuring accurate positioning of a series of gears and spacers used in counter gear assemblies of small machines, has been made possible through the development of the new Waldes Truarc Bowed "E" retaining ring, made by Waldes Kohinoor, Inc., Long Island City, N. Y.

Previously gears and spacers were positioned between two conventional type retaining rings sprung in grooves on a shaft. While the distance between the grooves remained constant on every shaft, the overall dimensions of the assembled component parts varied due to existing tolerances. An accumulation of minus tolerances resulted in excessive end-play requiring shims of various thicknesses for each assembly. On the other hand, the accumulation of plus tolerances caused the gears and spacers to bind and in extreme instances assembly of the component parts becoming possible.



Waldes Truarc Bowed "E" retaining ring

To overcome the problem, the Bowed "E" Ring (type 5131) was developed which is a three-prong ring bent like a bow out of its plane at about its horizontal center line, to a degree corresponding to the maximum end-play as conditioned by existing tolerances. Gears and spacers are assembled between a "flat" standard Truarc "E" ring (type 5133) and a bowed "E" ring. The latter takes up end-play while having sufficient resiliency to permit the gears to turn freely, assuring constant alignment of parts and accurate meshing of gears under proper tension.

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Punch press and shear operators know how easily variations in the steel they work can cause trouble . . . how steel that is too soft can burr . . . how steel that is too hard can damage punches or blades. That's why they prefer steel that's *uniform*—steel *made by Inland*. Uniform source of raw materials, uniform steelmaking procedures using the same modern equipment, uniform workmanship—made possible by Inland's completely integrated, closely knit plant—explain why the uniformity of the Inland Steel received, today, will be the same as that received last month . . . or last year. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

Exhibitors and Their Booth Numbers

National Metal Exposition at Philadelphia October 25-29

Acetogen Gas Co.....A-1549
Acme Manufacturing Co.....618
Acme Steel Co.....737
Acme Tool Co.....1909
Air Reduction Sales Co.....1845
Ajax Electric Co.....645
Ajax Electrothermic Corp.....645
Ajax Engineering Corp.....645
Alan Wood Steel Co.....1809
Aldan Welding Supplies, Inc...A-1567
Allison Co.....705
Alloy Rods Co.....345
Alvey-Ferguson Co.....1819
American Brake Shoe Co.....126
American Brass Co.....337
American Chain & Cable Co., Inc...116
American Chemical Paint Co.....1654
American Cladmetals Co.....124
American Gas Furnace Co.....1509
American Emblem Co.....1729
American Gas Association.....1301
Amer. Inst. of Bolt, Nut & Rivet Mfg. Assn.....1564
American Manganese Steel Co....126
American Metal Market Co.....1918
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Working without FORM-A-GASKET

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For Making Leak-Proof, Pressure-Tight
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Form-A-Gasket No. 1 . . . a fast setting paste that dries hard.

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All are leak-proof to gasoline, fuel oils, lubricating oils, hot or cold water, anti-freeze solutions, etc.

More detailed information on request.

Order Through Your Auto Supply House.

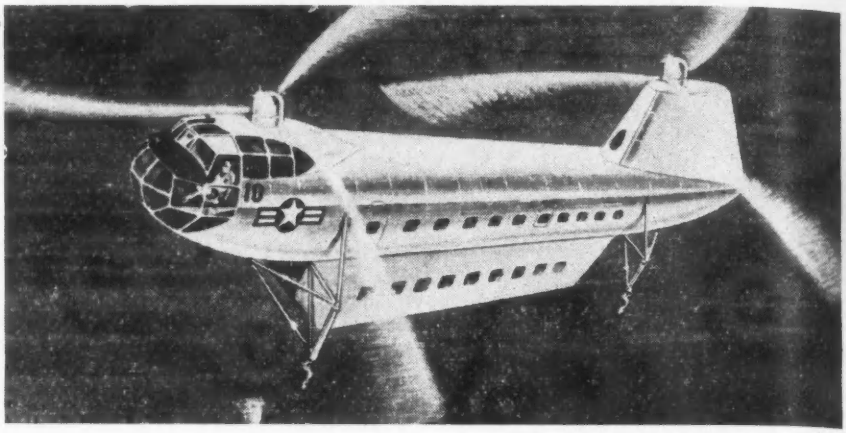
PERMATEX COMPANY, INC. BROOKLYN 29, N. Y.

General News

(*Continued from page* 23)

Schultz Made Assistant to L-M General Manager

Carl F. Schultz, formerly resident engineer at Lincoln, has been named engineering assistant to T. W. Skinner, general manager of Ford's Lincoln-Mercury Div. Before joining the Ford organization in October, 1946, he was production engineer and national assistant manager of parts and accessories for Oldsmobile.



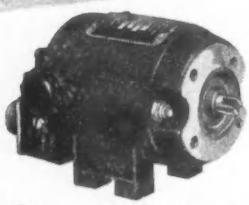
Acme

SKY MAMMOTH

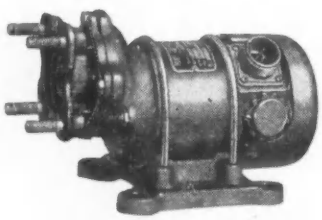
Recently announced by the U. S. Air Force, the all-metal, tandem-rotored Piasecki XH-16 giant transport helicopter shown in the artist's conception above, is as large as a C-54, and its detachable capsule is said to compare in size with a Greyhound bus.

Lamb Electric MOTORS

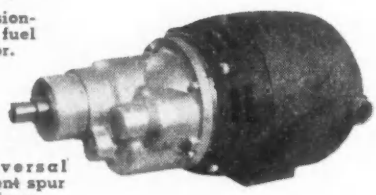
Complement Good Product Design



Compactly designed motor developed for metering pump and special instrument service.



Base-mounted, explosion-proof aircraft geared fuel transfer pump motor.



Light-weight universal motor with efficient spur gear speed reducer.

• Because of their advantages of special application, high efficiency and exacting manufacture, Lamb Electric Motors complement good product design to produce the high standard of performance required of today's leading motor-driven products.

This is another reason why Lamb Electric Motors are being teamed up with more and more of America's finest products.

THE LAMB ELECTRIC COMPANY
KENT, OHIO

Lamb Electric
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

Bridgeport Brass Enters Replacement Field

The Bridgeport Brass Co. has announced that it has entered the replacement field for tire valves and accessories which are being distributed through established automotive distribution channels. Continuing to supply leading tire and tube manufacturers for original equipment, Bridgeport Brass' resale line includes all those items necessary to meet replacement needs for passenger cars, trucks and buses, farm tractors and implements equipped with pneumatic tires.

Automobile Hobby Group Organized in Detroit

Oliver Barthel of Detroit was elected president of The Automobile Enthusiasts of America, a new hobbyists organization at its founding convention in Detroit early in September. Mr. Barthel has a long history in the automobile business, having been associated with Henry Ford many years ago. James Melton, well known singer and a collector of old automobiles, was elected a vice president, contingent upon his acceptance. J. Lee Barritt, treasurer of the Automobile Club of Michigan, William B. Stout well known automotive engineer, and F. W. Thompson of Windsor, Canada were also made vice presidents. Other officers are Frank Marine, Detroit, secretary; Rolland D. Hardt, Stockbridge, Mich., treasurer. Harold B. Mayer, founder of the association was approved as executive secretary, a permanent position. The constitution of the organization defines the purpose of the group as an association for those whose principal interest and topic of discussion is the automobile. It defines three types of hobbyists: collectors of automobile literature, antique cars, name plates, and similar items; amateur engineers,

(*Turn to page* 66, *please*)

GET BETTER PERFORMANCE AND CUT COSTS WITH INCO NICKEL ALLOYS

Next time you have a metal selection problem, consider this:

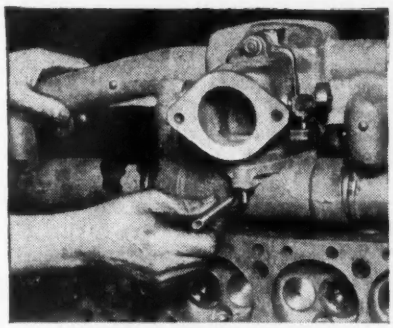
Many small-size forms of INCO Nickel Alloys are no more expensive than comparable ones of less effective metals—*and some forms are actually cheaper.* This is because of the ease with which ductile INCO Nickel Alloys are formed into wire, wire cloth, strip and small size tubing.

And that's only half the story.

You can drive your fabricating costs down too, because unit operations are fewer. You save all the expense of coatings and special finishes because these materials are solid, corrosion-resistant metals. Fewer anneals are necessary. And you will often need less metal because INCO Nickel Alloys are stronger than structural steels.

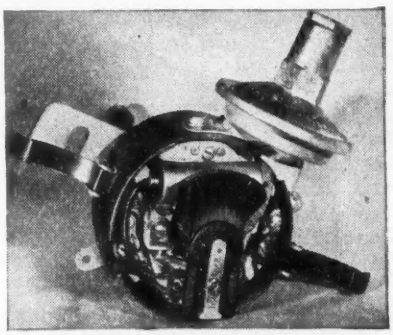
And think of the performance you get with INCO Nickel Alloys. These lustrous alloys are rustproof, tough and wear-resistant. They withstand extremes of temperature, and resist vibration fatigue and spark erosion.

Perhaps you have a metal problem right now. You can write us about it or call one of the distributors listed below. While you are at it, why don't you find out for yourself how surprisingly inexpensively you can get all the advantages of INCO Nickel Alloys in small diameter tubing, wire, wire cloth, small diameter rod, perforated metal and Su-veneer clad strip.



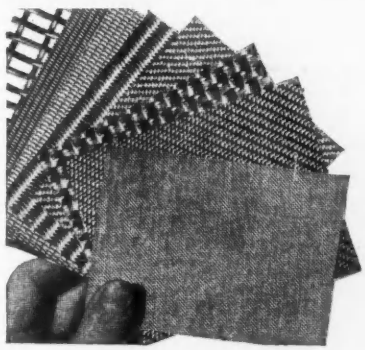
WITHSTANDS HEAT

Automotive choke tubes are made of Inconel for resistance to high heat and corrosion.



RESISTS SPARK-EROSION

Monel's resistance to spark erosion and corrosion increases performance of this distributor rotor.



PROVIDES STRENGTH

High strength of Inco Nickel Alloy wire screen and cloth provides resistance to stress and abrasion as well as corrosion.

INCO NICKEL ALLOYS ARE DISTRIBUTED BY:

Whitehead Metal Products Co., Inc.
Williams and Company, Inc.
Pacific Metals Company, Ltd.
Steel Sales Corporation
J. M. Tull Metal & Supply Co.
Metal Goods Corporation
Eagle Metals Company

THE INTERNATIONAL NICKEL COMPANY, INC.

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NICKEL INCO ALLOYS MONEL* • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL* • NICKEL • "D" NICKEL • "Z" NICKEL
*Reg. U.S. Pat. Off.

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Chrysler Corp., Chrysler Div.—**Stewart W. Munroe,** General Sales Manager, has announced his resignation; he will enter private business.

American Bantam Car Co.—New directors elected are **George M. Streicher, C. J. Smith, George J. Henrich, John G. Painter** and **E. B. Brownell**; Mr. Brownell was also elected Asst. Treasurer.

General Motors Corp., Buick Motor Div.—**Otis L. Waller** has been appointed General Sales Manager of Buick. Two new Asst. General Sales Managers were named. They are **A. H. Belfie** and **J. B. Nash. Kenneth H. Hendershott** has been made Divisional Comptroller, and **Irving H. Larkin** succeeds the late **Fred W. Letts** as General Supt. **Robert E. Rudd** has been appointed Director of Merchandising. The new Pacific Coast regional manager is **John W. Waddell,** and **Frank Bridge** has been made Chicago manager.

Packard Motor Car Co.—**Everett G. McGill** has been appointed Manager of the Organization and Analysis Dept.

Ford Motor Co.—**William Burnett** has been appointed Asst. Chief Engineer for Ford passenger cars. **Fred G. Rumball's** appointment as Director of West Coast Purchasing Operations has been announced. **William J. Swallow** has been appointed Manager of the Buffalo assembly plant. He succeeds **Edward C. Miller** who has been transferred to the Dearborn assembly plant.

General Motors Corp. — Announcement has been made of the appointment of **Wilbur H. Norton,** who will work on special assignments, reporting directly to **Mr. C. E. Wilson,** President.

Ford Motor Co., Lincoln-Mercury Div.—**Morgan Collins** has been appointed Divisional Controller, and **Emil A. Ulbrich** has been named Resident Controller of the Lincoln plant.

The Austin Motor Co. (Canada) Ltd. —**Herbert D. Fearman** has been made Development Manager of the new Hamilton plant.

Reo Motor Co.—**R. D. Hilty** has been appointed General Sales Manager. Mr. Hilty succeeds **Don C. Streeter,** resigned. **Morton Golumbia** has been made Secretary-Treasurer of the Reo Motor Company of Canada, Ltd.

Republic Aviation Corp.—**Thomas A. Murphy** was appointed Sub-Contractor Mgr. of the Corporation.

Eaton Manufacturing Co.—**M. P. Winther** has been made Vice-President and Director of Engineering. Mr. Winther is also a Director of the company.

Walker Manufacturing Co.—The appointment of **Walter C. Trautman** as Chief Engineer, has been announced.

The Hydraulic Press Mfg. Co.—**Carl J. Lamb** has been made Consulting Engineer.

Philco Corp.—**Leslie J. Woods** has been elected Vice-President, Industrial Div.

Jack & Heintz Precision Industries, Inc.—**Kenneth G. Donald** has been elected President of the Company, succeeding **Byron C. Foy,** who resigned as President and Chairman of the Board, the latter position being abolished.

General Motors Corp., AC Spark Plug Div.—**Wilson S. Isherwood** has retired as General Sales Manager of the Division. His successor is **John C. Hines,** who was formerly in charge of the Company's Philadelphia territory.

Raybestos-Manhattan, Inc. — **S. R. Zimmerman, Jr.,** has been named Director of Friction Material Research and Development.

General Electric Co.—**Raymond R. Rausch** has been elected as Vice-President and will be in charge of company manufacturing policy, succeeding **Elmer D. Spicer,** who has retired.

The Transportation Assoc. of America—The Executive Committee has elected **Leif Gilstad** as Vice-President, with headquarters at Chicago.

Permafuse Corp.—**Sydney G. Tilden, Jr.,** has been appointed Project Engineer.

The Davisbilt Products Co.—**John F. Winchester,** President and Director, has announced his resignation. **Robert Simon** will succeed Mr. Winchester.

Pittsburgh Plate Glass Co.—**Robinson F. Barker** has been appointed Asst. Manager of Plate Glass Sales.

Ampco Metal, Inc.—**S. C. Lawson** has been appointed General Sales Manager.

American Wheelabrator & Equipment Corp.—**Sherrill S. Deputy** has been appointed Sales Manager.

Natl. Automobile Dealers Assoc.—**Robert W. Kneebone** has been made Managing Director.

Perfex Corp.—**Frank W. Doyle** and **Ralph W. Goetz** have been made Asst. Sales Mgrs.

Progressive Welders Sales Co.—**Roy S. Rankin** has been named Manager of the Company.

Farrell-Birmingham Co.—**Robert M. Honegger** was elected a Director.

Devoe & Raynolds Co., Inc.—**William J. Nevin** has been made Advertising Manager.

Jessop Steel Co.—**Samuel M. Gahagen** has been appointed Chief Metallurgist.

Libbey-Owens-Ford Glass Co.—**Joseph P. Crowley** has been made Plant Manager of East Toledo plants. **G. L. Morris** is the new General Supt. of the Laminating plant. **Charles A. Miller, Jr.,** is General Supt. of the East Toledo Plate plant. **Henry M. Dodge** is co-plant Manager of East Toledo plants.

Natl. Highway Users Conference—**Russell D. Lund** has been named regional representative of the Conference, for Illinois, Indiana, Ohio, Michigan and Wisconsin.

Cook Electric Co.—**George W. Perry** has been appointed Advertising Manager.

Hyster Co.—**Paul Brainard** has been named head of the newly created Engineering Standards Dept.

Bales 110 Tons of Scrap Daily

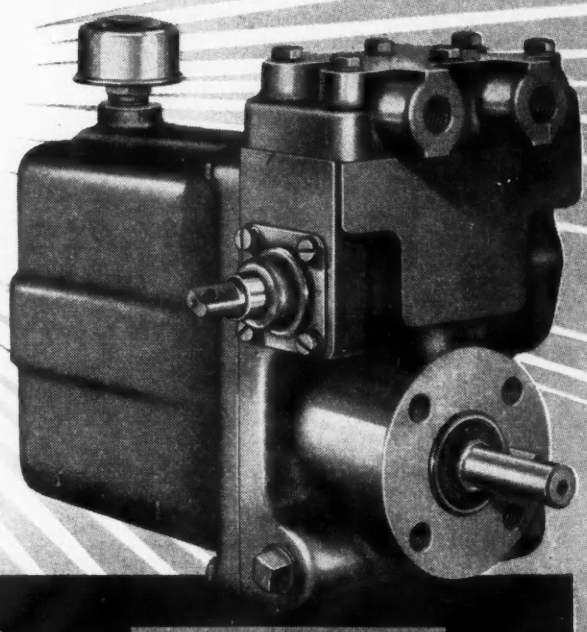
(*Continued from page* 44)

ejected bale is automatically pushed onto a flight conveyor at the exit end of the baler. This power-driven conveyor, in turn, moves the bales to an elevated station from which they are deposited into a box car on the spur track. Incidentally, since the box car must be moved step-by-step to facilitate uniform loading, it is connected at the side to a short section of a power-driven conveyor which serves to move the car at the will of the control operator.

The foregoing concerns the handling of scrap consigned for baling only. In the interest of further steel conservation, De Soto is salvaging stampings rejected because of spoilage due to poor drawing quality of sheet metal. For this purpose stampings such as hoods and fenders are cut into narrow strips, the latter then being fed through heavy rolls for straightening. These prepared strips then go to a group of small presses where the metal is used for making various small stampings in which drawing quality is of no consequence.

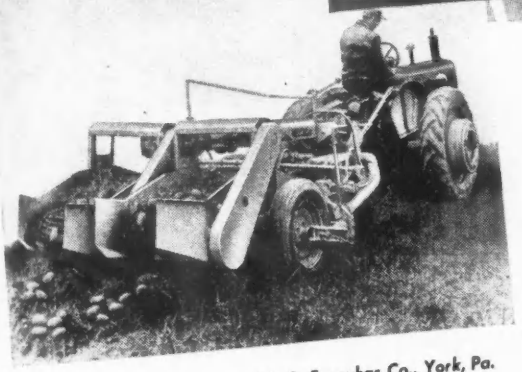
"PACKAGED HYDRAULICS"

MANY ADVANTAGES
MANY USES



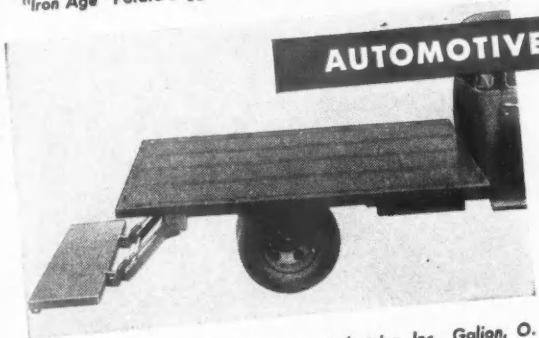
VICKERS POWER PACK

AGRICULTURE



"Iron Age" Potato Digger of A. B. Farquhar Co., York, Pa.

AUTOMOTIVE



"Hydraul-Lift" Tail Gate of Cemco Industries, Inc., Galion, O.

CONSTRUCTION

"Profit Mover" of Construction Products Corp., Lynwood, Calif.

The Vickers Hydraulic Power Pack is a compact, self-contained hydraulic system which meets a wide variety of control needs in mobile equipment. It provides the machinery equipment manufacturer with a quick, easy, low cost installation which assures his customers of long trouble free service.

Tractors, planters, cultivators, plows, stackers, loaders, harvesters, rakes, mowers, etc., are among the many agricultural uses for the Vickers Hydraulic Power Pack. On commercial vehicles, it saves time and labor by actuating dump hoists, lifting tail gates and other miscellaneous operations. In the construction industry, light duty scrapers and bulldozers, fork lift trucks, loaders, scoops, snow plows, tractors, etc., are conveniently and economically controlled by the Vickers Hydraulic Power Pack. It saves labor, speeds operation, cuts costs.

The Vickers Hydraulic Power Pack is a compact package weighing only 55 pounds. It incorporates an oil tank, filter, vane pump, overload relief valve and operating valve. Write for Bulletin 46-48a.

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(Continued from page 62)

inventors and designers; and the men who read and "talk" automobiles. A Detroit office for the group will be maintained.

B.L.M.A. Pleads Nollo Contendere in Anti-Trust Case

On Aug. 21, 1947, a Federal grand jury in the United States Court for the Southern District of New York, handed up three indictments against 21 corporations and 53 individuals, members of the Brake Lining Manufacturers' Association, Inc., charging them with alleged conspiracies to violate Section 2 of the Sherman Antitrust Law. On Sept. 22, 1948, before United States Judge Edward A. Conger, in New York City, 17 corporate defendants and 9 individual defendants pleaded nollo contendere to the said charges and the indictments were dismissed as to all of the other defendants. The 17 corporate defendants were fined $121,000 and the 9 individual defendants were fined $31,000.

Lester D. Stickles, 36 West 44th Street, New York City, counsel to the Brake Lining Manufacturers' Association, Inc., and for a number of the defendants, in pleading nollo contendere stated:

"While the association pleads nollo contendere to the indictments charging violations of the antitrust laws, it desires also to point out certain facts.

"The violations charged are based directly upon practices and procedures established under the guidance and at the insistence of the National Recovery Administration. This was at a time when the United States Government was actively engaged in promotion of uniformity in industry and of fair practices among competitors.

"These procedures as proposed by NRA and accepted by the industry resulted in standardization of sizes and in other uniformities which materially benefited the industry as a whole and resulted in substantial savings to the public. Accordingly, such practices were openly adopted and followed as accepted customs of trade, with no effort whatsoever on the part of the members of the association to conceal them.

"As a matter of fact, the same standards were required in connection with all bids submitted on Government purchases of brake linings and clutch facings. When the computation of list price factors was discontinued by the association because of these indictments, a representative of the Department of the Navy protested vigorously, pointing to the confusion which would result from dropping standards in use since the NRA.

"It must appear odd, then, even wholly incongruous, that while various agencies of the Government urge upon the industry the use of such standards as an accurate measure for purposes of quotations, another arm of the Government questions these standards as susceptible to suspicion of a conspiracy to fix prices.

"Despite all this, despite the progress and the economies effected through such standardization, they have been voluntarily abandoned.

"There are 21 companies and 53 individuals named in the indictments. The total number of witnesses called would run into the hundreds while the evidence to be presented would be by the truckload.

"The trial of the issues raised would necessarily cover a long period of time, calling for the appearances of executives from the four corners of the nation. At a time when the industry is endeavoring to the utmost to catch up with production needs of the country and to complete the shift from wartime exigencies to peacetime operations, the industry obviously could ill afford to spare top management for a long period."

J. Francis Hayden, chief of the local Antitrust Division of the Department of Justice, represented the Government.

MOTION PICTURE MOBILITY

This fully-equipped traveling motion picture studio was recently delivered to the R. G. Wolff Studios, Hollywood, Calif., by the Stewart & Stevenson Services, Houston, Tex. Mounted on a three-ton GMC truck, this combination camera truck and mobile power unit contains complete lighting equipment, cameras, cables and other equipment.

Dr. Peter C. Cornell

Dr. Peter C. Cornell, 83, one of the founders and a director and treasurer of the Trico Products Corp., died in Buffalo, N. Y., on Sept. 24.

SHIPMENTS OF COMPLETE AIRCRAFT AND CIVIL AIRCRAFT ENGINES*

AIRCRAFT

	July	Seven Months
Complete Aircraft	1,119	6,263
Military Aircraft:		
Number of Planes	199	1,305
Civil Aircraft	920	4,958
Personal Planes:		
Number	903	4,817
Value	$3,432,040	$20,043,953
Transport Planes:		
Number	17	141
Value	$6,078,713	$52,057,160
Aircraft Parts—Value	$1,766,985	$13,350,151
All Other Products—Value	$1,812,833	$18,856,764
Total—Value of All Products	$13,090,571	$104,308,028

CIVIL AIRCRAFT ENGINES

	July	Seven Months
Civil Engines:		
Number of Engines	641	.....
Value of Engines	$1,088,043	$23,358,994
Value of Parts	$2,115,412	$14,049,185
Total—Value of Civil Engines and Parts	$3,203,455	$37,408,179

*—Bureau of the Census and Civil Aeronautics Administration.

All around the world and since way back when

Sealed Power piston rings have been giving efficient service in the engines of American passenger cars, trucks, busses, tractors and ships. Today Sealed Power factories, laboratory equipment, and staff are the finest in all our 36-year history. These facilities, and the experience gained in years of close collaboration with engine builders, are at your service today—to help make your good engines even better.

SEALED POWER CORPORATION

MUSKEGON, MICHIGAN • IN CANADA: STRATFORD, ONTARIO

SEALED POWER PISTON RINGS

PISTONS · CYLINDER SLEEVES

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-101—Tapping and Threading Attachments

Ettco Tool Co., Inc.—A new 6-page bulletin (No. 22) fully describes the company's latest line of tapping and threading attachments for drill presses. The various sizes are listed; prices and details of speed, capacities, and construction, as well as a table to simplify the selection of quill clamps to be used with these attachments on any standard drill press are included.

L-102—Instrumentation System

Automatic Temperature Control Co., Inc.—An 8-page catalog, R-10, gives detailed engineering and application data covering the new ATC instrument system, Atcotran. Schematic sketches illustrate applications to all basic processing and measurements of numerous variables such as density, flow, weight, etc.

L-103—Aluminum Alloys and Mill Products

Reynolds Metals Co.—Aluminum Alloys & Mill Products Data Book is the title of a new 162-page book containing factual information on aluminum alloys and mill products. The book contains 163 tables of data. Pages of explanatory text cover a wide range of related subjects such as the alloy designation system, temper designation system, heat-treatable and non-heat-treatable alloys, etc. Fabricating methods are discussed; a section on surface finishes for aluminum is included; in another section aluminum pig and ingot products are described and their production explained. A discussion of the physical, chemical and mechanical properties of aluminum is also to be found, along with definitions of terms used. The book is available to engineers, designers and technical men. Requests for copies should be made on your *company letterhead* to Reynolds Metals Co., 2500 South Third Street, Louisville 1, Ky.

L-104—Tachometers

Metron Instrument Co.—Bulletin No. 104 describes new, low cost, electric tachometers for all installations. Several tachometer heads are shown for industrial, marine, diesel and aircraft applications.

L-105—Miniature Ball Bearings

Miniature Precision Bearings, Inc.—Catalog No. 49 gives comprehensive specifications on the more than 40 types and sizes of standard miniature ball bearings produced by the company, including radial, super-light, pivot, angular contact and thrust bearings. Information is also included on variations of standard bearings and the supplying of special bearings in their size range. Data is furnished on design variations, lubrication, weights, applications and other material of particular interest to designers of precision mechanisms.

L-106—All-Hydraulic Presses for Metal Working

The Hydraulic Press Mfg. Co.—Bulletin 4804 gives an up-to-date review of the complete H-P-M line including metal drawing presses, forging, forcing, shaft straightening, briquetting, extruding, powder metallurgy, metal die casting machines and production units for the plastics industry, including injection molding machines, compression and transfer molding presses. Presses for the chemical process industries are also described.

L-107—Small Tool Catalog

George Scherr Co., Inc.—A new 28-page small tool catalog presents the company's line of micrometers, vernier calipers, height gages and other machinist's tools. The book also introduces a number of newly developed specialties for precision work.

(*Turn to page 83, please*)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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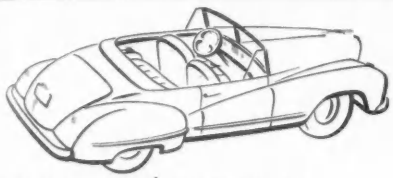
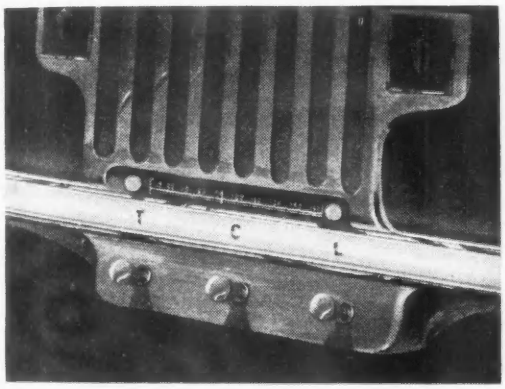
WHY USE "LUCITE" FOR MICRO*STYLING?

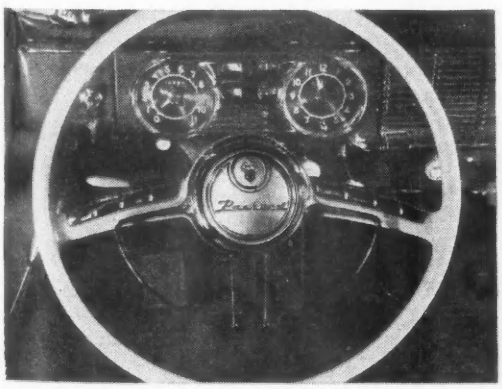


WHAT IS MICRO-STYLING?

MICRO-STYLING is the design of small but important automobile accessories for beauty and utility too. A smart, sturdy horn button . . . a crystal-clear dial face . . . a sparkling taillight lens . . . many *little things* are bound to impress car buyers. They'll help re-sell your make of car again and again. All-important MICRO-STYLING calls for the best in quality materials . . . and that means Du Pont "Lucite"!



A glowing rod of crystal-clear "Lucite" pipes a beam of light under instrument panel, lights choke, throttle, and headlamp switches. Rod brings light around from bulbs behind the panel. It's an idea for MICRO-STYLING that may help sell the car.



This handsome horn button is one of 15, made of "Lucite," on today's cars. It's an example of the beautiful three-dimensional color effect that can be obtained with this Time-Tested plastic. (1948 Packard horn button molded by Hoosier-Cardinal Corp., Evansville, Ind.)

For the "luxury touch," 17 of today's most-wanted makes of cars feature 99 parts made of the Time-Tested plastic.

For long-lasting beauty and utility, too . . . for the extra goodwill that helps build repeat sales, you can't beat Du Pont "Lucite" acrylic resin in MICRO-STYLING your car.

Consumers are impressed by accessories of "Lucite." It has a quality look and feel . . . and it's durable. The superior features found in "Lucite" combine to give a true *luxury* impression.

"LUCITE" HAS LONG-LASTING COLOR

A distinctive variety of color-fast hues is available—transparent, translucent and opaque. They hold their beauty through years of weathering and hard service. They have since 1937.

"LUCITE" HAS SPARKLING TRANSPARENCY

Smart, practical lenses, dial faces, etc., of crystal-clear "Lucite" transmit up to 92% of light. "Lucite" can be "edge-lighted," and will "pipe" light around curves.

"LUCITE" HAS LUXURIOUS SMOOTHNESS

Consumers are quick to notice the smooth, warm look and feel of handles, knobs, horn buttons and other pieces made of "Lucite." It's not brittle . . . and it withstands sharp knocks.

"LUCITE" HAS EXCELLENT DURABILITY

Accessories of "Lucite" give top service for years and years . . . retain full beauty and utility inside and out. In normal use, it isn't damaged by gasoline or lubricants, or by many common solvents that cause crazing in less durable plastics. "Lucite" parts are readily molded and machined.

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on "Lucite" and other Du Pont plastics. No obligation. If you wish, Du Pont technical men will be glad to consult with you in confidence and advise on applications of Du Pont plastics to help your MICRO-STYLING plans. Address E. I. du Pont de Nemours & Co. (Inc.), Plastics Dept., Room 2010, Arlington, N. J.

Italy's First Salon

(*Continued from page* 27)

chassis and body construction is employed, but to provide for special bodies, a special chassis with square-section side rails, cruciform members and a platform, is also produced. The larger of the two Lancias has independent suspension all round; on the smaller model only the front wheels are independently sprung. An innovation is the adoption of a fifth gear overdrive.

Alfa Romeo is specializing on an expensive high speed, six-cylinder model in two versions—a sports and supersports. Of the same bore and stroke, 2.80 in. by 3.93 in. (147 cu in.) both have overhead camshafts, the sports model being equipped with a single carburetor and developing 90 hp at 4600 rpm and the supersports having three carburetors with a power output of 105 hp at 4800 rpm. Box section side rails with very rigid cross members form the chassis. The differential housing is mounted on the rear cross members, drive to it being by a two-piece open shaft. The four wheels are independently suspended, enclosed coil springs being used in front and long fore and aft torsion bars at the rear. The gearshift lever has now been placed on the steering column. Standard bodies are being produced, of steel and aluminum, but a considerable proportion of the output is for custom built bodies.

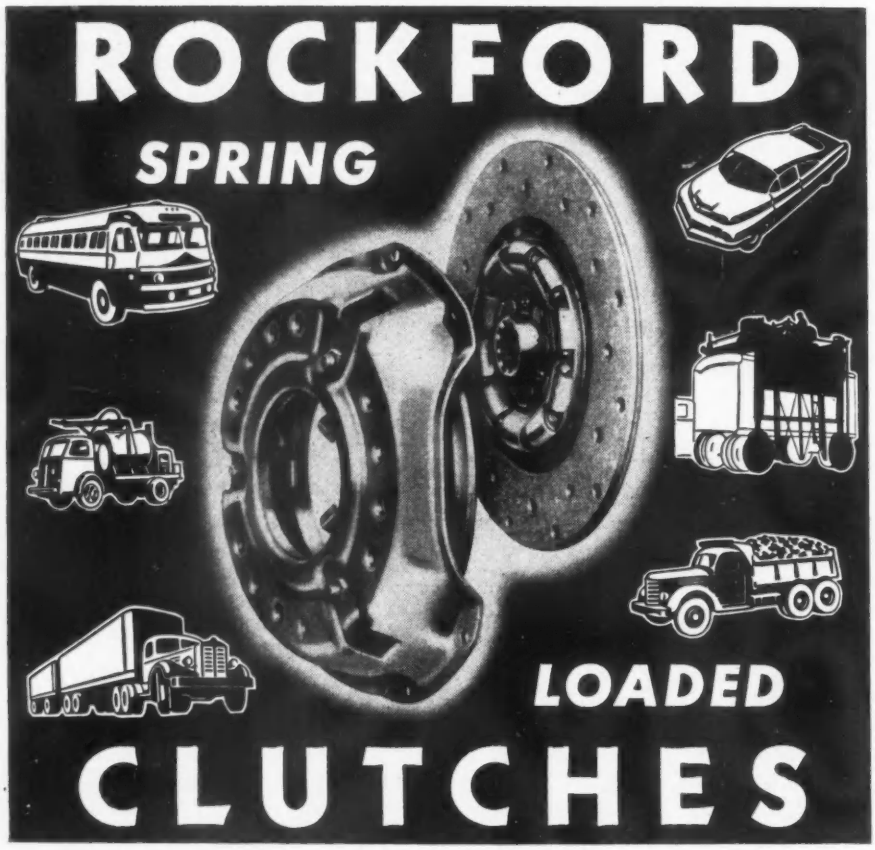
More than any country in Europe, the sports type car appeals in Italy, and even the standard models, particularly the two Fiats, are transformed into semi racers. Special heads, with either vertical valves or inclined valves operated by pushrods from the original camshaft, are on the market, and there are transformations for increasing the bore and lengthening the stroke of the 34.7 cu in. Fiat to a capacity of 45.7 cu in. With roller bearing crankshafts and needle bearing connecting rods they develop up to 40 hp.

Ferrari, a firm which originated as a racing organization, has four versions of a 12-cylinder, 122 cu-in. engine, starting with a model having a compression ratio of 6.8 to 1 and giving 90 hp at 5,600 rpm and rising practically to a racing type with a compression ratio of 11 to 1 and an output of 155 hp at 7000 rpm. All the engines have a bore of 2.36 in. and a stroke of 2.31 in. The twelve cylinders are a single casting in Electron alloy with special iron liners. The two heads are of light alloy, with inclined valves and two overhead camshafts. Plain bearings are used throughout. The semi-racing model has three downdraft carburetors, with an air scoop on the top of the hood and an air conduit on the top of the engine, thus providing a ramming effect for the air. The transmission provides a fifth overdrive, with direct drive in fourth speed. Independent suspension is used all round, a transverse spring and support arms being used in front and torsion bars at the rear. On the 103-in. wheelbase model, total weight with a four-passenger closed body is stated to be 1980 lb. The single-seater, semi-racing model, with a wheelbase of 86 in., weighs 1210 lb and has a maximum speed of 158 mph. The frame construction, in common with all the Italian racing and semi-racing cars, is of elliptical section tubing.

Maserati, another racing firm, is in production on a 122 cu in., six-cylinder model stated to develop 140 hp. It has independent suspension with coil springs front and rear. This car is produced as a fast four-seater tourer.

Among the entirely new cars is the Opes three-cylinder, air-cooled radial, with front-wheel drive. The engine, with a piston displacement of 48 cu in., is designed on aviation lines, and built almost entirely of light alloys, with enclosed overhead valves operated by enclosed pushrods. It is reported to give 24 hp at 3800 rpm, the compression ratio being 6.5 to 1. The cylinders are set at 120 degrees, cooling being assisted by a positively-driven, four-blade fan. The engine is mounted at the front end of a frame composed of two box-section side rails, with forward suspension by a transverse spring and support arms.

(*Turn to page* 72, *please*)



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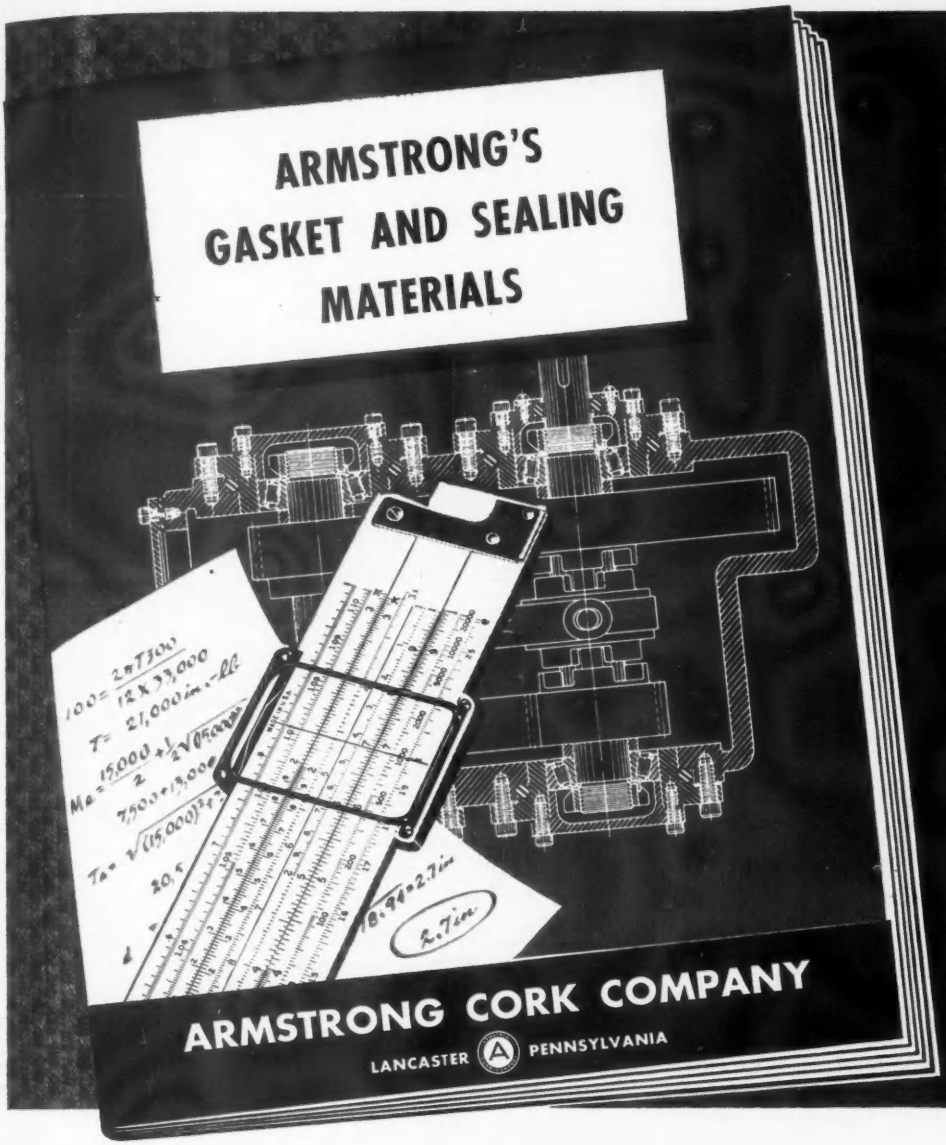

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- Ten technical discussions
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Valuable gasket information

When you're thinking about gaskets, you'll find it a good idea to refer to the new, enlarged, 24-page edition of "Armstrong's Gasket and Sealing Materials." This booklet contains all the technical data that made the first edition so popular with design engineers and purchasing agents. Includes latest government specifications, as well as up-to-date information on synthetic rubber, cork-and-synthetic rubber, cork compositions, and fiber sheet sealing materials. Also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as the radio, electrical, automotive, petroleum, and transportation industries. Fill in coupon and mail it now.

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The all-metal body forms a complete unit with the hood, headlamps, bumpers, rear wheels and coil springs for rear suspension. This unit is attached to the side rails at four points—two just behind the transmission, and two at the extremities of the rails. It is claimed that the four passenger car, with a wheelbase of 86 in., weighs only 1540 lb.

The lowest powered car in the show is the vertical twin Moretti (see Aug. 1, 1947 issue of AI, page 37) of 21.3 cu in. The entire engine is of light alloy, with liners for the cylinders. The entire chassis and body frame is composed of square section tubes. Front wheels are independently sprung, with a transverse spring and support arms, supplemented by hydraulic shock absorbers.

Cisitalia, a firm which has come on the market since the war, has three variations of one model, with an overhead valve engine of 67 cu in., presented as a sports, special sports and semi-racer. The compression ratios start at 7.5 to 1 for the normal type, increasing to 9.5 to 1 for the special sports, and 9.8 to 1 for the semi-racer, which develops 65 hp at 5800 rpm. The frame is entirely of chrome-molybdenum steel tubes, and in the case of the coupe this frame also forms the foundation of the light alloy body. In the case of the racing and semi-racing types, sheet aluminum is attached to the steel frame. Front wheels are independently sprung and there is a rigid axle at the rear. The racing model, with a single-seater body weighs only 815 lb.

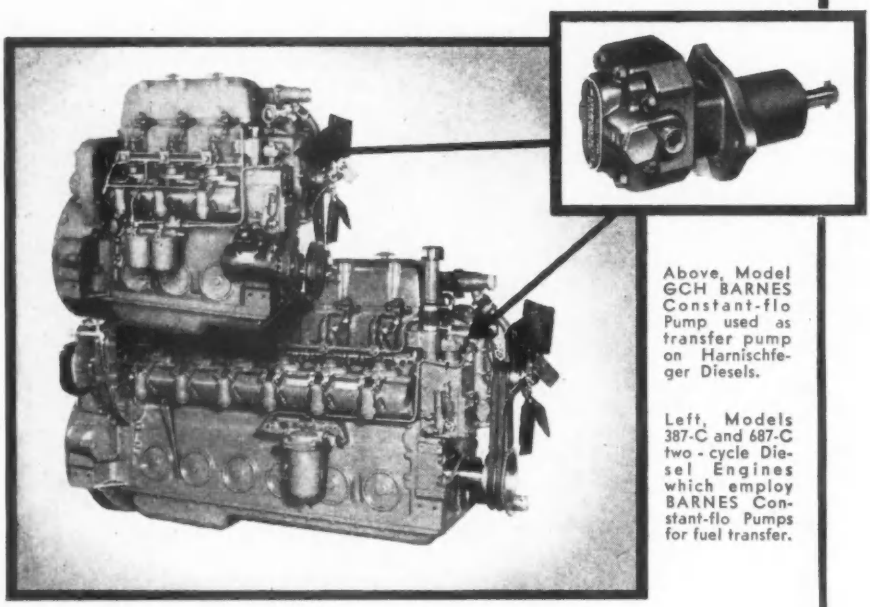
More than any country in Europe, Italy has developed a distinctly national styling (see Oct. 1, 1947 issue of AI, page 36), which is the work not only of the specialists employed by the big manufacturers, but also of the large number of customs body builders who have given full vent to their artistic genius. There is a minimum amount of ornamentation, the front end treatment is light, bodies are built out to the full width of the vehicle, door hinges are concealed, and practically all handles are flush and are brought out by operating a push button. There is a tendency to make use of only one wide door, even for sedans, and Lancia, among others, has abolished the central pillar to give easier access. Transparent plastic is rather generally employed for the roof, this material having sufficient flexibility to allow it to be raised along the leading edge to create a draft and to be drawn down by hand screws to secure a water-tight joint. Among the many variations of front end treatment, a popular style is the smallest possible number of straight lines. The standard sports Fiat, for instance, which is not fitted with bumpers, has a radiator grille composed of eight vertical chromium ribs, flanked at the base by four horizontal bars. The headlamps are recessed in the fenders. Alfa Romeo reproduces the familiar form of the radiator with a diminutive grille, the four headlamps are on a horizontal line, and between the dual bumpers, which merge into the fenders, there is a slot to admit air. On another model the radiator shape is reproduced in the grille and at its base, to left and right, are three chromium bars between which air is admitted. The bumper merges with the front fenders. Some of the most distinguished styling in the show is presented by Pinin Farina, Stabilimenti Farina, and Carrozzeria Touring.

Commercial vehicles, comprising both trucks and coaches, are an important feature of the show. The leading makers are Fiat, Lancia, Alfa-Romeo, Isotta Fraschini, O. M. and Bianchi. Heavy state taxes on gasoline have resulted in the practically exclusive use of Diesel engines for all commercial purposes, and again for reasons of economy, big load carriers, with a very extensive use of trailers, are common. Nearly all the Diesels are straight sixes with overhead valves, in several cases four valves per cylinder being operated through push rods from a single camshaft. Direct injection is employed in nearly every case. Owing to its economy, the Italians are making very extensive use of aluminum for oil pans, valve covers, water pump housings, etc. All engines are mounted forward, by the side of the driver. Fiat is using an eight-speed

(*Turn to page 74, please*)

John S. BARNES

Constant-flo ROTARY GEAR PUMPS



Above, Model GCH BARNES Constant-flo Pump used as transfer pump on Harnischfeger Diesels.

Left, Models 387-C and 687-C two-cycle Diesel Engines which employ BARNES Constant-flo Pumps for fuel transfer.

PROVED IDEAL for DIESEL TRANSFER PUMP SERVICE

The exacting requirements of Diesel engine manufacturers are thoroughly satisfied by the high performance of BARNES Constant-flo Rotary Gear Pumps, as shown by the examples above. The little BARNES Pump is mounted above the governor box near the front of the engine. The Harnischfeger Diesels illustrated are used for stationary service as well as in certain of the cranes, shovels, and draglines made by this prominent manufacturer of heavy road-building and construction machinery.

Outstanding features of BARNES Pumps that fit them for heavy automotive service are — an exclusive, patented gear tooth structure which gives high volumetric efficiency at standard pump speeds throughout a wide temperature range with low viscosity fluids — close effective pressure control, over wide engine speed variations from low idle to governed speeds, attained with streamlined-flow by-pass valve — precision manufacture by experienced craftsmen to split-thousandths tolerances on special mass production machinery — reliable high performance with long life.

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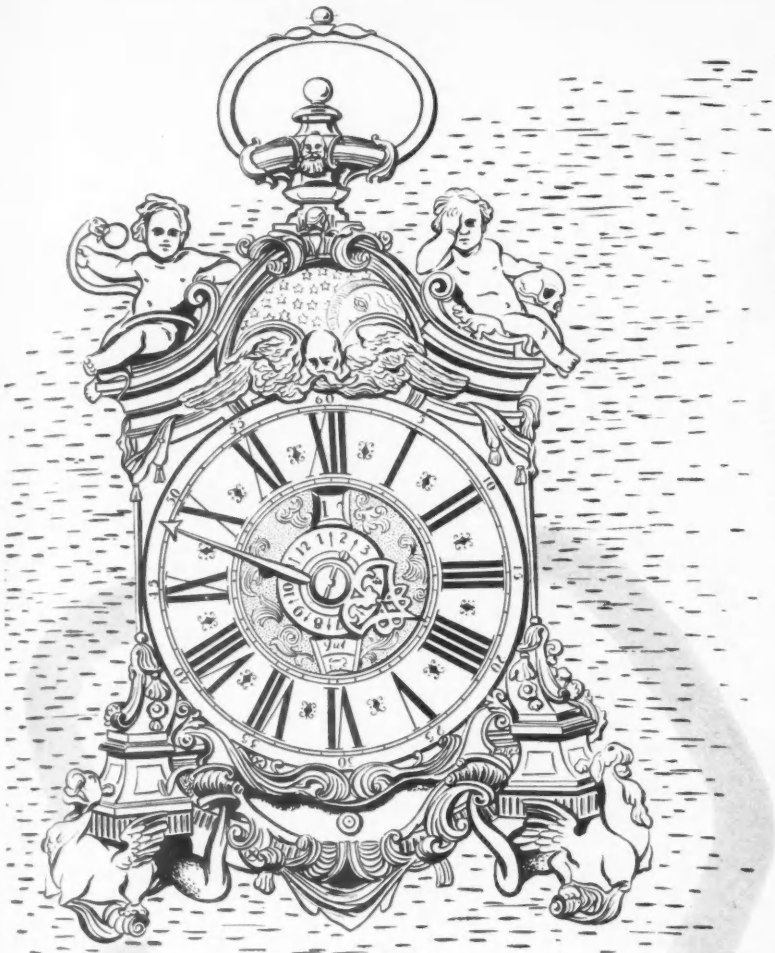

THE HOUR

The Clearing press shown is a double action, double eccentric mechanical type with a 72" x 84" bed capacity of 350 tons, operating at 4 strokes per minute.

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Cutting production *time* cuts production *costs*. If, with an equal investment of man-hours, you can turn out seven times as much product, you're putting 420 minutes into every hour.

Compared to old, slow methods of casting, forging, grinding and machining, press methods often speed production far more than sevenfold. Press methods not only reduce costs, but frequently turn out a more useful, more salable product to boot.

If you manufacture a metal article that sells in large quantities—or could sell that way at the right price—it will pay you to consult Clearing. Don't think your job is too big, or too precise, or too intricate. Chances are, Clearing presses are already doing something just as difficult. It costs you nothing to find out.

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transmission, the 666 heavy duty 6½-ton truck, and a five speed transmission on the 3½-ton model. Alfa Romeo makes use of a double reduction gear, giving eight combinations, while the Lancia six-cylinder Diesel chassis also has a reduction gear providing eight forward speeds and two reverse speeds. The reason, of course, for the increased number of speeds is the mountainous nature of the country and the very extensive use of trailers.

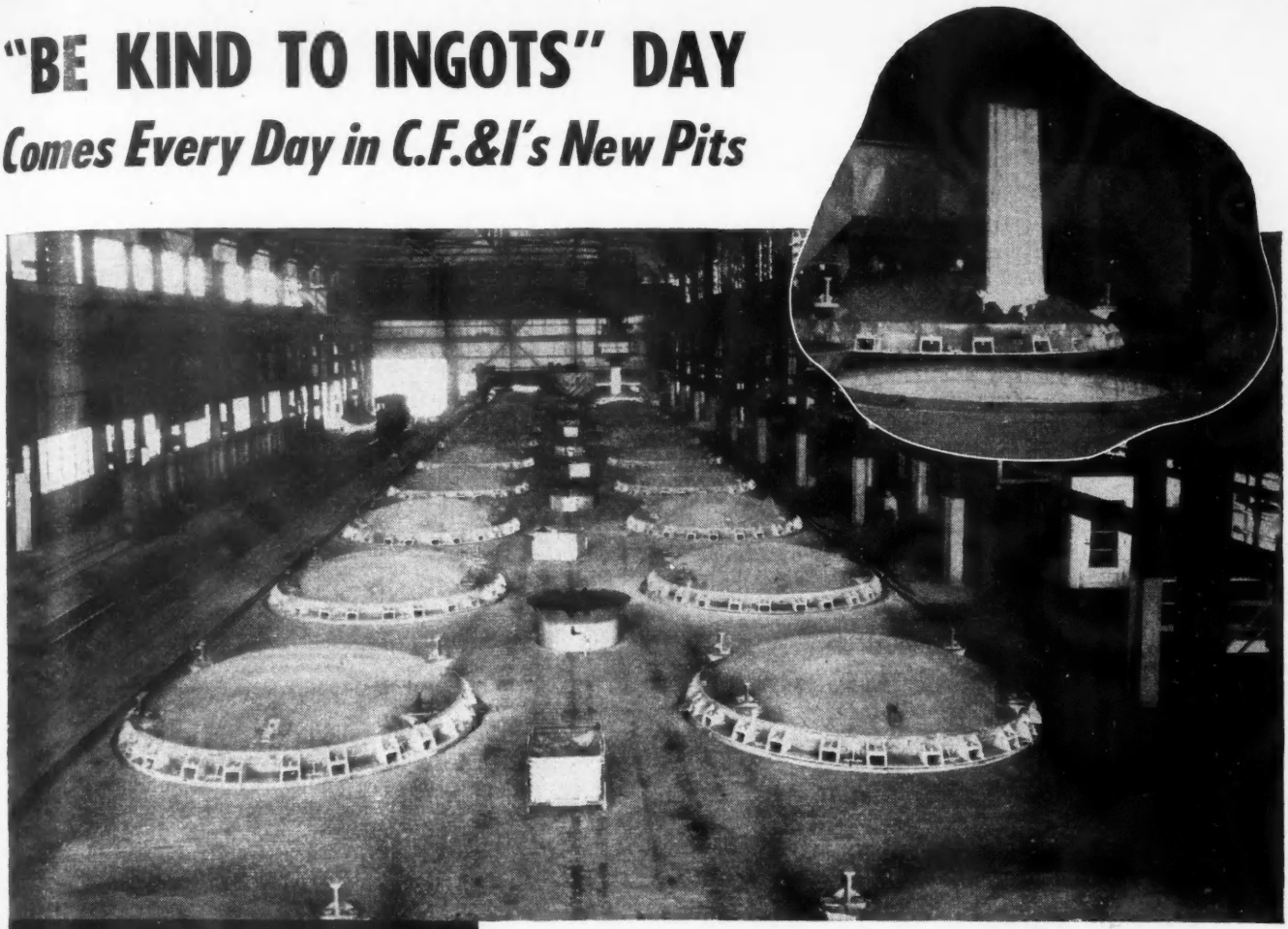
Alfa Romeo has one truck model and a corresponding chassis for bus service with independently-sprung front wheels, the arrangement being support arms and coil springs, supplemented by hydraulic shock absorbers. The only other case of independent front suspension is on a Cattaneo 2-ton gasoline engine powered truck, where the arrangement is also coil springs with support arms. This chassis is distinctive in being built up entirely of welded steel tubes. Rails are fitted on the chassis and rollers on the engine to permit easy dismounting of the power plant after the connections have been broken.

A license has been taken out in Italy for the General American Aerocoach, of Chicago, and this has brought forth some rear engine mountings. The most distinctive is a V-eight Diesel produced by O. M. on license from Saurer. The eight cylinders, of 4.23 by 5.50 in. bore and stroke, are a single casting with the crankcase, the two cylinder heads are in iron, and two vertical valves per cylinder are used, with pushrod operation. The fuel pump is mounted in the angle formed by the cylinders. The transmission provides five forward speeds. Final drive to the double-reduction rear axle is by an open shaft. O. M. is also making use of the Saurer engine brake. Both Fiat and Alfa Romeo six-cylinder Diesels have been modified to allow of rear mounting for coach service.

Recent developments are the use of three-axle trailers for trucks, the front and rear axles being steerers, and two-axle trailers, both axles being steerers, for coach service. The leading makers of this type of vehicle are Viberti of Turin, and the Bartoletti Co. Both these firms show a motor coach and trailer, the two vehicles being identical so far as external lines are concerned, with a total capacity of 130 seated passengers. The trailer has stub axles, the steering being effected by the two bar to a steering arm, the reverse movement being transmitted by a tubular shaft to the rear axle. With a total length of 69 ft, these vehicles are intended for a high-class international touring service and are elaborately equipped with an air conditioning plant, a bar, electric cocktail mixers, radio, internal telephone and individual seat lighting. In contrast with the 69 footers, the maximum allowed under Italian road regulations, Orlandi makes use of a Jeep as a tractor for a 19-passenger semi-trailer having rear steering wheels. This is intended for service on winding Alpine passes.

"BE KIND TO INGOTS" DAY

Comes Every Day in C.F.&I's New Pits



Micromax Control on Salem Pits Helps Accurate, Economical Heating

It's the ingot that matters in soaking pit operation! Salem Engineering Co. is thinking about ingot quality when they design and install a 24-pit battery like this, and recommend controls to regulate operation. Colorado Fuel & Iron Corp. is planning the future of ingots and ingot products when they decide on temperature cycles and set up operating procedures.

These planners have assigned Micromax Controllers to help protect the "interests" of the ingots during the long soaking period. Micromax gives this protection from several angles. Of course, it doles out fuel, in exactly varied amounts to heat the great chunks of steel accurately and uniformly. It preserves correct temperatures, despite the effects of charging, pulling and changes in ambient conditions. But Micromax is also tied into the regulation of combustion and furnace pressure, so that these conditions are held firmly in line during the necessary adjustments of heating rate and soak temperature. Result—every day is "Be Kind to Ingots" Day in the pits, and the rolling mill is sure of a constant supply of ingots properly conditioned for processing.

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LEEDS & NORTHRUP CO.

Jrl. Ad N-33-667(1)

Security Board Places Orders

(*Continued from page* 54)

location of reserve tools, and their shipment to production facilities.

The basic control for distribution of machine tools, similar to WPB's General Preference Order E-1-b is being set up complete in all respects. While the organization of a War Production agency is being set up, including plans and programs for control of the machine tool industry, should an emergency arise before completion of these plans, NSRB intends to rely temporarily upon World War II organization forms and procedures. Control measures covering the other types of production equipment now being studied by NSRB are also being prepared.

Recognizing the fact that the machine tool industry is one of feast or famine, the expansion in wartime is almost completely in the national interest and not of ultimate profit, NSRB recommends the adoption of rapid amortization of plant and equipment of machine tool builders.

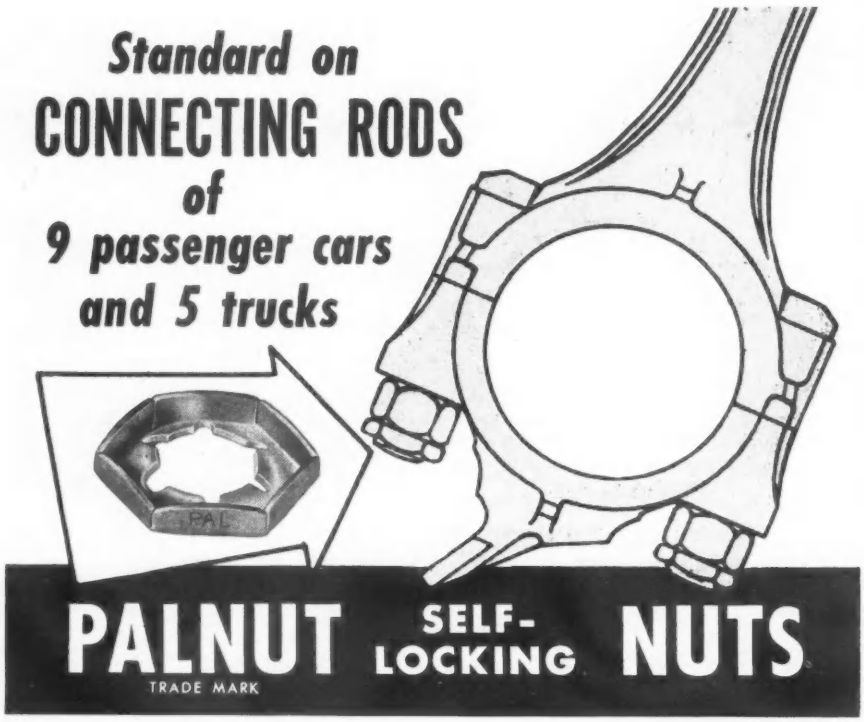
Channels of authority between the Armed Services, Munitions Board, a War Production agency and industry are being established.

Authority to move government-owned tools regardless of bureau or branch in which title or sponsorship previously rested will be delegated to the War Production agency.

Requisitioning orders for used or idle tools permitting control of the used machinery market are being prepared.

Finally, NSRB recommends that "in the current rearmament program, reserve tools should be used to the utmost. Disregarding economy, tools placed in arms production will assure a greater degree of tool readiness than if left in storage. Moreover, withdrawing of tools from storage will provide constant check on conditions of all stored tools. For example, there were many tools withdrawn from the aircraft industry after termination of contracts. The condition and usability of these tools for production of modern aircraft is highly uncertain. Many are probably single purpose or special tools. If they cannot be put to use in the current air program, their usefulness a number of years hence in any emergency would be questionable.

"Parenthetically, the same use should be made in the current program of the reserve stocks of accessory equipment, cutting tools, gauges, etc., which the military departments have in storage. Abrasive products, such as grinding wheels, subject to deterioration in storage, should be utilized now."



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Wherever you require vibration-proof fastenings — on engine, chassis or body—use PALNUT Self-Locking Nuts and cut your assembly costs at the same time. For heavier assemblies, apply PALNUTS on top of regular nuts; for lighter assemblies, use PALNUTS alone. Low in cost—easily, speedily assembled with hand or power drivers—may be removed and re-used. Send details of your application for recommendation and free samples. Literature on request.

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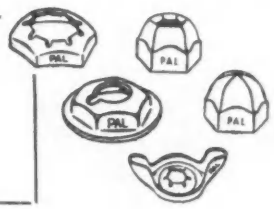


AIRBRIEFS

(*Continued from page* 49)

Air Lines, its Miami-Havana route to either Eastern Air Lines or Delta and its Miami-Jacksonville route to "an appropriate carrier." CAB has instigated the inquiry under its authority to foster "sound economic conditions in the industry." The action is unprecedented insofar as it would destroy National Airlines, Inc. Actually, the Board does not have the authority to force National to sell, or the other airlines to buy, any of its routes or segments, but the control of the Board over mail pay and route authorization is tantamount to economic control of any airline. National has lost nearly one million dollars this year in addition to two million dollars last year and its passenger load factors (per cent of capacity) have shrunk to about 30 per cent (compared to 60 to 90 per cent on other airlines). The right of the CAB to put an airline out of business may be challenged in the courts as a precedent-setting test.

Six-Month Nemesis

Grounding of the Martin 2-0-2 transport follows the fateful six-month

(*Turn to page* 80, *please*)

Are you getting your share of

$21,600,000 SAVINGS PER YEAR

made possible by A-C welding?

4 out of every 5 welders in use today are d-c. Yet, actual operating figures prove that a-c welding is faster, cheaper and better.

It's time to forget old concepts of welding costs and efficiency—to reverse this ratio of a-c to d-c equipment in line with proved operating results. The potential savings are startling—conclusive evidence that you cannot afford to continue using d-c welding extensively.

SAVINGS IN WAGES—

Because a-c welding is 20% to 30% faster, permitting excellent welds at higher speeds on all classes of work, nearly $1,240,000 *monthly* can be saved in labor costs (at $1.50 per hour).

SAVINGS IN POWER—

Because a-c welding requires less power, giving 85% to 90% efficiency as against 55% to 65% for d-c machines, the potential *monthly* power saving is over $500,000 (at 2c per kilowatthour).

SAVINGS IN DEPRECIATION—

Because fewer a-c machines are required, potential savings of more than $18,800 per month can be realized (based on a capital charge of 1% per month).

SAVINGS IN MAINTENANCE—

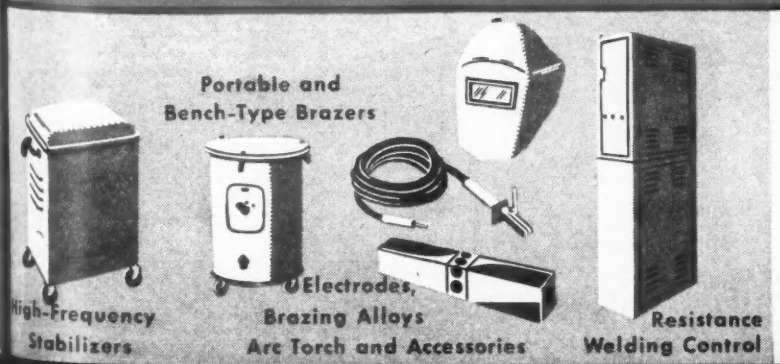
Because a-c welders require less maintenance, potential monthly savings on maintenance total more than $60,000.

These add up to total monthly savings of more than $1,800,000, or $21,600,000 per year. These are "boxcar" figures, but they are backed up with facts.

A Westinghouse welding specialist is ready to give you these facts, and to show you actual dollars-and-cents savings possible in your plant by replacing d-c welders with modern a-c welding techniques and equipment.

Get in touch with your nearby Westinghouse office, and ask a welding sales engineer to call. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21449

EVERYTHING for Welding ANYTHING!



MAIL THIS COUPON

Westinghouse Electric Corporation
P. O. Box 868, Pittsburgh 30, Penna.

YES—send me details on the new Westinghouse "65" A-c Welder—also on items checked.

- ☐ Automatic Welding Equipment
- ☐ Engine-driven Welders
- ☐ HF Stabilizers
- ☐ Brazers
- ☐ Electrodes
- ☐ Resistance Welding Control
- ☐ D-C Welders

Name _____

Company _____

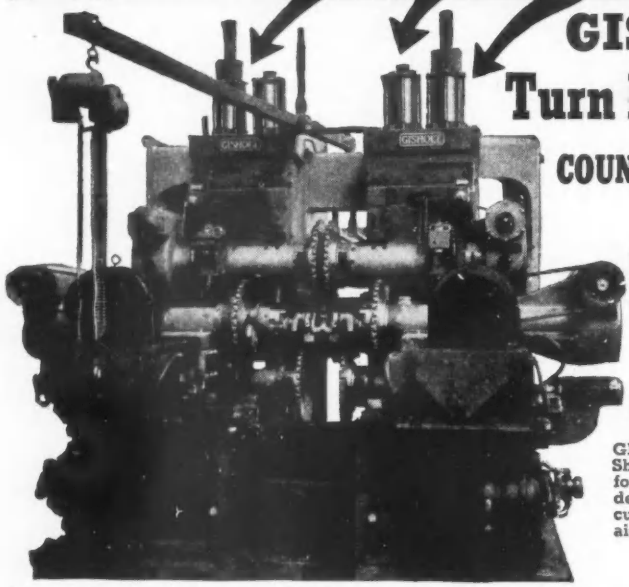
Address _____

period of grace that has emerged as the pattern for new aircraft. Observers recall that the Lockheed Constellation, Douglas DC-6 and now the 2-0-2 have run into difficulties following about six months in service and advance a strong argument for the six-month service test that has been proposed on all new transport aircraft by several groups, led by the Air Line Pilots Association.

The 2-0-2 was grounded following the Winona, Minn., tragedy last Aug. 29 when a 2-0-2 lost a wing in a thunderstorm. Subsequent examination of other 2-0-2's revealed at least two cracked spars. Tests began immediately by the Glenn L. Martin Co., U. S. Bureau of Standards and the Aluminum Company of America. Although grounding of 24 2-0-2's by Northwest Airlines created a problem solved only partially by pressing Douglas DC-3 and DC-4 transports into service, there is little indication at the moment that the 2-0-2 will be placed back in service for many weeks during which a thorough examination of existing aircraft, re-analysis of the wing beams and structural modifications have been completed. But engineers point out that this is just the sort of thing predicted all along when the fast, high-wing-loading postwar transports got into strong gust conditions. Solution, although costly, appears to be cancellation of flights in bad weather, the very thing the airlines are trying hardest to avoid!

LAW of GRAVITY Suspended . . .

GISHOLT Turn Mill Slides COUNTER-BALANCED by NOPAK AIR CYLINDERS



GISHOLT Model TMP-6 Crank-Shaft Turn Mill equipped with four 10" NOPAK Air Cylinders which suspend heavy cutter-slides in a column of air.

The Crank-Shaft Turn Mill pictured has two vertical columns, each of which carries 2 cutter slides, one upper, and one lower.

Each slide weighs about 550 pounds and has its own counter-balancing 10" NOPAK Air Cylinder located at the top of the vertical column. There is a constant and continuous air pressure on these cylinders, and no valves of any kind are used. As these slides are counter-balanced by air, they have no gravitational weight. Their feed-movement is controlled by hydraulic cylinders.

This unique application is one of several which Gisholt has found for NOPAK Cylinders or Valves in building its line of Machine Tools. You can use them to advantage in your product . . . or in your plant.

GALLAND-HENNING MFG. CO., 2774 South 31st St., Milwaukee 7, Wisconsin

WRITE FOR NOPAK APPLICATION MANUAL

REPRESENTATIVES IN PRINCIPAL CITIES

NOPAK VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

A 5464-½I-A

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Relatively stable business conditions at slightly reduced levels are indicated. The *New York Times* index for the week ended Sept. 25 stands at 147.0, as against 147.1 for the preceding week and 142.3 a year ago.

Sales of department stores during the week ended Sept. 25, as reported by the Federal Reserve Board, equaled 318 per cent of the 1935-39 average, as compared with 337 in the week before. Sales were one per cent above the corresponding distribution a year earlier, as against a preceding similar excess of 12 per cent. The total in 1948 so far reported is seven per cent greater than the comparable sum in 1947.

Electric power production increased contraseasonally in the week ended Sept. 25. The output was 10.2 per cent above the corresponding amount in 1947, as compared with a similar advance of nine per cent shown for the preceding week.

Railway freight loadings during the same period, totaling 907,971 cars, were 0.2 per cent less than the figure for the week before and 3.2 per cent below the corresponding number recorded in 1947, but the decline was of less than seasonal magnitude.

Crude oil production in the week ended Sept. 25 increased 48,750 bbl to a daily average of 5,343,100 bbl, or 147,100 bbl more than the comparable output in 1947, despite the continuance of a strike in California oil refineries.

Production of bituminous coal and lignite during the week ended Sept. 25 is estimated at 11,840,000 net tons, 5000 more than the output in the week before. The total production in 1948 so far reported is 5.2 per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended Sept. 30, according to *Engineering News-Record*, is $128,139,000, or 28 per cent more than the preceding weekly figure but 23 per cent below the comparable sum in 1947. The total recorded for 40 weeks of this year is 23 per cent more than the corresponding amount in 1947. Private construction is three per cent above that a year ago, and public construction has increased by 51 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended Sept. 4, at 167.4 per cent of the 1926 average, was 0.3 per cent less than in the preceding week but eight per cent above the corresponding figure in 1947.

Member bank reserve balances increased $1190 million during the week ended Sept. 29. Underlying changes thus reflected include an advance of $1408 million in Reserve bank credit and a rise of $224 million in Treasury deposits with Federal Reserve banks, accompanied by a reduction of $3 million in money in circulation.

Total loans and investments of reporting member banks decreased $698 million during the week ended Sept. 22. An advance of $18 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $15,201 million, shows a net increase of $2199 million in 12 months.

Publications Available

(*Continued from page* 68)

L-108—Collapsing Taps

The Geometric Tool Co.—Bulletin S-4 describes and illustrates the new improved Geometric Class S collapsing taps. The various features are described and a table of specifications is included.

L-109—New Product Index

E. F. Houghton & Co.—A new attractive product index designed to guide purchasers in the various applications of Houghton products is available. The 6-page folder lists the products by trade name and their individual application. They include such categories as lubricants, metal working, textile processing, leather oils and greases and hydraulic and transmission products.

L-110—Transformers

Lindberg Engineering Co.—Transformer Div.—A new 4-page bulletin describes applications, design and construction of standard Lindberg dry type transformers; transformers for special applications, etc. The bulletin is illustrated and contains wiring diagrams for the various type transformers.

L-111—Carbon and Stainless Steel Tubing

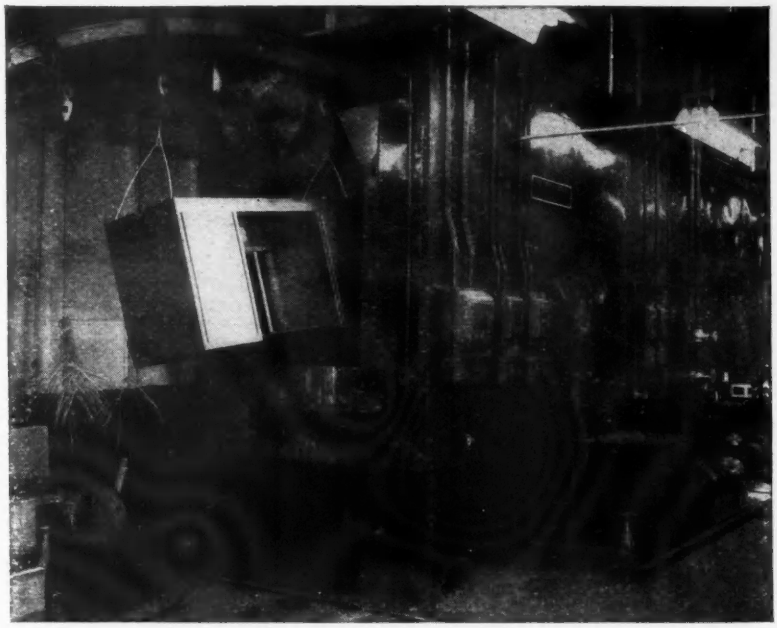
Joseph T. Ryerson & Son, Inc.—A new 32-page bulletin on steel tubing contains information on seamless and welded carbon steel tubing, stainless tubing and pipe, structural tubing and seamless and welded boiler tubes. Beginning with the history and manufacture of tubing, the bulletin points out the many applications for mechanical tubing; gives information on machining, heat treatment and fabrication; tells how to specify size and quantity, etc.

L-112—Rust Preventive

Rust-Oleum Corp.—A new descriptive catalog, Rust-Oleum Stops and Prevents Rust, outlines the qualities of the company's laboratory-and-field tested rust preventive products for industrial, marine, farm and general uses.

Timken Roller Bearing Co. Adopts F.O.B. Pricing

Timken Roller Bearing Co. is selling all products of its steel and tube division on an FOB mill basis. The action was taken to conform to the Supreme Court decision which held that basing point pricing is illegal. Customers, however, may buy products at the mill and provide their own transportation within the limits of the loading facilities available at the plant.



Sheet steel kitchen cabinet assemblies at Tracy Manufacturing Company are Duridized in this power spray washer for long paint life and overall product protection.

Chemicals for Rust Proofing Paint Bonding

American Chemical Paint Co.
TECHNIGRAM
AMBLER, PA.

Pickling Acid Inhibitors Rust Removing Preventing

Lasting Paint and Metal Protection at a Minimum Cost!

DURIDIZING provides simple, effective, economical, rapid cleaning and phosphate-coating of sheet steel products in preparation for painting. The process requires but one chemical, "DURIDINE"—is free from sludge—can be applied by spraying or dipping in mild steel equipment—and imparts excellent protection to painted sheet metal. It can also be used to clean and condition aluminum and other non-ferrous metals for a lasting paint finish.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine *
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RUST REMOVING AND PREVENTING
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PICKLING ACID INHIBITORS
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Visit the **ACP DISPLAY** of Inhibitors and Metal-Working Chemicals at the

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Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY
AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

Designing Camshaft Chain Drives

(*Continued from page* 39)

be avoided. In these cases the following devices are resorted to with success. The chain is constructed with a non-back-bend feature which tends to limit the vibratory motion, however, this feature is most effective in preventing thrashing motion of the slack strand of the chain. A snubber may be designed into the cover at a point where the chain would vibrate at a maximum amplitude. This snubber would normally clear the chain by 1/32 of an inch and the chain would strike it only when the amplitude began to build up. The striking of the snubber reduces the motion of the chain in the same manner as a bell is prevented from ringing by placing a finger of the hand on the rim.

Lubrication and Ventilation

A timing chain is easy to lubricate effectively, and although several methods are used, the one that is considered best is described here. The conditions of good lubrication of a chain drive demand that the inside or link profiles of the chain and the faces of the sprocket teeth be continuously wetted by oil. This is best accomplished by directing a .050-in. diameter jet of oil under the pump pressure directly on the crankshaft sprocket. The rotation of the sprocket will threw the oil up to the camshaft sprocket and to the chain. This is illustrated in Fig. 3.

It is also imperative that the camshaft drive section of the engine be well vented to carry away all corrosive fumes which would attack the chain and cause excessive elongation. Modern engines are usually well vented, but it must be remembered that the camshaft drive should not be in a pocket where this venting is not effective.

Obviously these factors are involved in any form drive for a camshaft. It is believed, however, that the metallic flexibility of silent or toothed chain is the most efficient way of satisfying the requirements.

Manufacturing Problems

All features of a camshaft drive are not dictated by the requirements of the drive; some are the result of manufacturing convenience and necessity. Of these the most important are provision of holes in the web of the camshaft sprocket of such size that the sprocket can be chucked during the turning operations; the rim thickness should be great enough to withstand the stresses set up in machining; the transverse section of the sprocket should be so designed that it is possible to stack the turned blanks with the rims of the blanks bearing on one another for good hobbing conditions. The central hole should be of such size that an adequate diameter arbor can be used in the hobbing operation. The sprocket should be provided with a keyseat or offset mounting hole so that it is impossible to assemble the sprockets to the shafts in the improper timing relation. The timing marks should be dimensioned from this keyway or hole. The sprocket should be free of projecting hubs which make burr removal difficult.

The timing marks may be indicated in one of two ways: When the sprocket outside diameters run relatively close to one another, both sprockets can be stamped and the chain installed as shown in Fig. 4. If the sprocket outside diameters are so far apart that the lining of timing marks on the sprockets is indefinite, the sprockets and the chain can be marked and installed as shown in Fig. 5.

The method of mounting a sprocket to a camshaft is a matter of satisfying a preferred method of assembly. Two conventional methods are shown in Figs. 6 and 7. In Fig. 6 the sprocket is piloted and keyed to the camshaft and secured by a locknut and washer. The pilot is a wring fit to the sprocket bore. The design of Fig. 7 uses a hub which is pressed on the camshaft and

(*Turn to page* 86, *please*)

Essential...

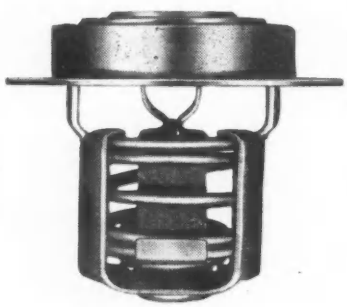
to TOP PERFORMANCE

in Today's High-Efficiency Cars and Commercial Vehicles

DOLE

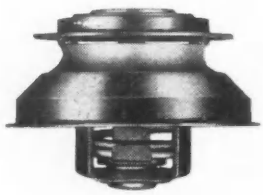
New-Type "DV" Thermostats

Designed to meet the needs of the modern cooling system, Dole "DV" Thermostats have long life power to control high pump pressures. Full seating pressure gives quick warm-up and operation is not affected by the installation of a pressure cap. All these factors contribute to improved cooling. New type thermal element proved in use for many years in other thermostatically-controlled products. *Four types give broad coverage of design needs.*

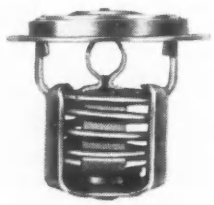


D.V.—1

D.V.—2



D.V.—3



D.V.—4

CONTROL WITH DOLE

THE DOLE VALVE COMPANY

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Ready for the SPLASHIEST months of the year?

Trico's "Two Little Squirts" are busier than ever when winter nears

Windshields become "mud shields" all too frequently during fall and early winter months. Dirty mist sprays the glass, blots out vision, makes driving hazardous. But NOT for the two million or more drivers who keep their windshields clean with an Automatic Windshield Washer. To help promote universal use of this important safe-driving aid, 14 makes of cars now have built-in connections which greatly reduce installation time by car dealers or repair shops. And Buick, Cadillac, Oldsmobile, Pontiac and Lincoln Cosmopolitan make complete installations at the factory.

Trico Windshield Washer Solvent makes the Washer usable the year round except when driving with an extremely cold windshield, Improves washing efficiency. Prevents jar breakage due to freezing. Non-injurious to car finish.

TRICO

Trico Products Corporation, Buffalo 3, N. Y.

Windshield Washers

Fully Automatic . . . Nothing to Pump

the sprocket is secured to the hub by cap screws. This design permits the chain and camshaft sprocket to be assembled to the engine with the crankshaft sprocket in place. This worthwhile convenience is obtained by the use of the separate hub.

The usual materials for the sprockets are cast iron for the camshaft sprocket and low carbon steel, carburized and hardened, for the crankshaft sprocket.

The two general types of chains supplied by chain manufacturers are center-guide type and side-guide type.

Regarding materials and manufacturing tolerances, a timing chain manufacturer should be consulted.

30th National Metal Congress

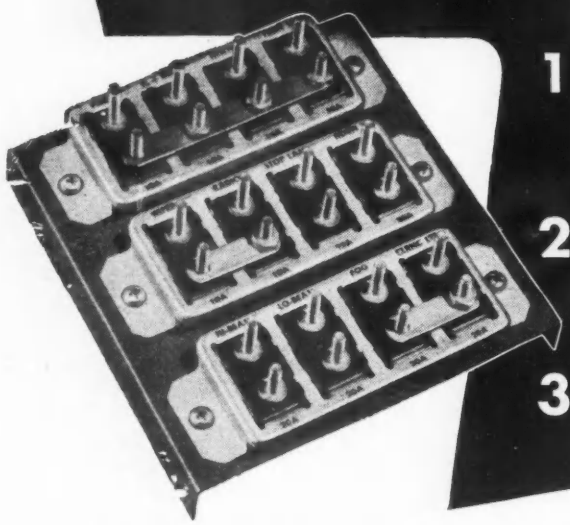
(*Continued from page 45*)

The Gold Medal of the American Society for Metals for 1948 will be presented during the Congress to Francis Cowles Frary, director of research, Aluminum Co. of America. Willard H. Dow, president, Dow Chemical Co., has been elected to receive the Society's Medal for the Advancement of Research for 1948.

HERE'S WHY { TRUCKS BUSES

Should be Equipped with

FASCO SNAP-MOUNT Circuit Breakers



1 Finish the run economically and safely . . . despite short circuit.

2 Locate the hard-to-find short safely and quickly.

3 Quick, easy installation.

• With FASCO Snap-Mount Circuit Breakers costly breakdowns due to dangerous overloads and short circuits are eliminated. When trouble develops, the OFF and ON action of a FASCO protected circuit makes it possible to get intermittent use of the circuit without damage to any of the parts.

The cycling OFF and ON action of the circuit breaker allows the mechanic to locate trouble easily and safely . . . and more quickly than would be the case with a "blown" fuse.

The exclusive FASCO Snap-Mount makes installation (for the life of the vehicle) simple and inexpensive. Write for further information or phone our Detroit office, 6432 Cass Avenue, Detroit 2, Michigan. Phone Madison 6300.

FASCO CIRCUIT BREAKERS

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Safeguard Operation of Automotive Electrical Equipment Instantly . . . Automatically . . . from Dangerous Overloads or Short Circuits.

F. A. SMITH MANUFACTURING CO., INC., ROCHESTER 2, N. Y.

Electrical Engineering and Manufacturing Serving the Automotive Field for 26 Years

CALENDAR

Conventions and Meetings

Automotive Parts Rebuilders' Assoc., St. Paul	Oct. 16-18
Nat'l. Metal Trades Assoc., New York City	Oct. 18-20
Nat'l. Safety Council Safety Congress & Expo., Chicago	Oct. 18-22
Antomobile Old Timers Annual Mtg., New York City	Oct. 19
SAE Production Mtg., Cleveland	Oct. 21-22
Automobile Salon, Prague	Oct. 23-31
Amer. Welding Soc. Annual Mtg., Phila.	Oct. 25-29
Amer. Soc. for Metals Nat'l. Metal Congress & Expo., Phila.	Oct. 25-29
Amer. Soc. Body Engineers, Annual Convention, Detroit	Nov. 3-5
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4-5
Amer. Soc. for Quality Control Conference, Chicago	Nov. 4-5
London Passenger Car Show	Oct. 27-Nov. 6
Society of Motor Mfrs. International Motor Exhibition, London	Oct. 28-Nov. 6
Nat'l. Tool & Die Mfg. Assoc. Annual Mtg., Milwaukee	Nov. 14-17
Nat'l. Assoc. of Mfrs. Congress of American Industry, New York City	Dec. 1-3
Soc. for Experimental Stress Analysis —Annual Mtg., New York	Dec. 2-4
Amer. Inst. Electrical Engrs. Conf. on Arc Welding, Detroit	Dec. 6-8
Automotive Service Industries Show, Navy Pier, Chicago	Dec. 6-10
Nat'l. Assoc. of Eng. & Boat Mfg., Motor Boat Show, New York City	Jan. 7-15
SAE Annual Mtg., Detroit	Jan. 10-14
Nat'l. Materials Handling Expos., Phila.	Jan. 10-14
Nat'l. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24-27
Automotive Access. Mfrs. Annual Expos., New York City	Feb. 7-11
SAE Passenger Car, Body, Prod. Mtg., Detroit	Mar. 8-10
SAE Transportation Mtg., Cleveland	Mar. 28-30
SAE Aeronautic Mtg. New York City	Apr. 11-13
Salon International DeL' Aeronautique, Paris	April 29-May 15
Middle Atlantic Regional Automotive Show, Phila.	May 23-30

Torsion Bar Spring Design

(*Continued from page 29*)

ing to be practical in use and was too near the ultimate stress point. The diam was then increased to 0.560 in. which resulted in the figures to be found in the table.

These figures were derived from actual performance tests and not from theoretical equations. It is believed that theoretical equations are useful only as a guide to reach some approximate figure, and that only by actual experiments under the conditions most encountered, can the ultimate results be ascertained.

ARE PRODUCED *at a rate of* 1200 *per hour*

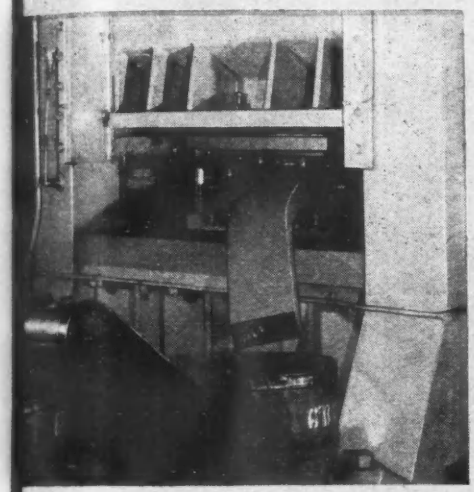
on a DANLY *400-Ton* STRAIGHT-SIDE PRESS

JOB DATA

Overall Size of Piece: 6¼" x 2⅛" x ½".

Stock: SAE 1335 Steel—½" thick, 2⅛" wide.

Operations: Pierce one 1 3/16" round hole and one straight-side hole 1 3/16" x ⅝", trim ends and sides.



(At left) Scrap is blown out of die through special shoot. Blanked pieces drop through cavity provided in bed of press. Power conveyor installed below bed discharges finished pieces in drum container.

- **New Ventilated Floating Disc Air Friction Clutch** increases flywheel energy—gives long, trouble-free service under severe operating conditions.
- **Built-In Automatic Filtered Oiling System** puts right amount of oil where needed—*including flywheel bearings.* Eliminates sludge—increases press life—conserves oil.
- **Sturdy All-Steel Welded Frame**—All weldments stress relieved before machining—insures accurate, permanent alignment.
- **Pitman Wrist-Pin Design**—Permits precision fitting of component parts, assures closer operating tolerances, promotes longer press life.
- **Air Pressure and Oil Pressure Safety Switches**—Safeguard press, prevent operation should pressures drop below safety point.
- **Safe, Convenient Electrical Controls**—Save time on die adjustments and add safety to trial strokes.
- **Balanced Flywheel, Balanced Clutch and Air Counterbalanced Slide**—Insure quiet, smooth-running performance.

One of nine Danly Presses at Chain Belt Co., Milwaukee, Wis., this 400-Ton, Straight-Side Unit speeds output of ½" thick side bars for "Chabelco" drive chain. A production rate of 1200 pieces per hour is attained with one operator at a press speed of 20 strokes per minute. The job is set up with a two-stage progressive die on a Danly Precision Die Set. Sixteen-foot lengths of ½" x 2⅛" SAE 1335 steel strips are fed by hand.

Tolerance of .003" held—Setup time reduced

The finished pieces are held to a tolerance of .003" on the hole centers. Accuracy of .010" is maintained around the blanked outline.

Setup time for this and other jobs is greatly reduced by reversible slide controls on the Danly Press. Because the press can be stopped at any point of its stroke *and quickly reversed* by push-buttons, die adjustments are made in a fraction of the time usually required.

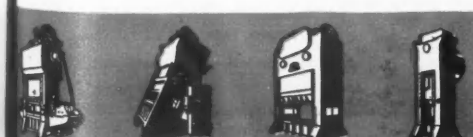
Other important advantages

The Danly exclusive ventilated air friction clutch which contributes to flywheel energy, and the complete built-in circulating oil system are other important Danly features which help to further reduce press downtime, increase production, and cut costs.

WRITE FOR MORE FACTS

Write today for free bulletin describing Danly's new and exclusive press engineering features. Find out how Danly Presses can help you cut costs and increase production. For free engineering assistance, send details about your problems. You will receive specific recommendations without obligation.

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



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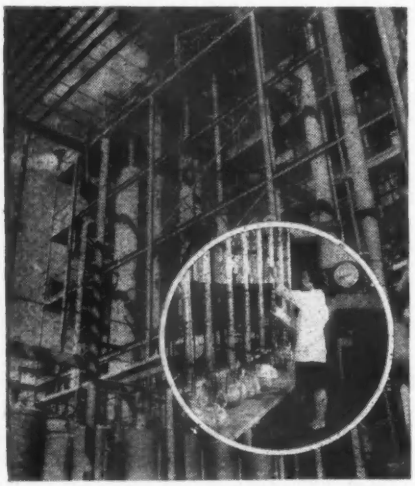
MECHANICAL PRESSES AND PRESS EQUIPMENT

Silicone News

DC SILICONES

HUNDREDS OF AUTHORS

Thanks to the cooperative efforts of hundreds of scientists and engineers in almost every field of industry, we have been able to compile a comprehensive new booklet about DC 200 Fluids.



In early 1943 glass distillation columns supplied the demand for silicone products. By 1944, we had completed a multi-million dollar plant to supply war time requirements. During the past four years plant capacity has been tripled to supply the domestic and foreign markets.

We had been producing DC 200 Fluids for less than a year when we published a 4-page leaflet describing these remarkably stable silicone fluids. Our newest publication is a 32-page booklet describing some of the more typical applications and giving data on the more significant properties of the DC 200 Fluids.

This volume of information is evidence of a unique and useful combination of properties in the fluids themselves. It is proof of the ready acceptance given to these basically new materials by scientists, engineers and technicians in almost every industry. They have improved the performance of all sorts of devices by capitalizing on the properties of DC 200 Fluids. We, in turn, have gained knowledge and experience by giving technical assistance.

The benefits of our years of research and experience in producing DC 200 Fluids and in adapting them to many different applications are made available in booklet No. M-C-13. We hope that you will call on the technical representatives assigned to each of our branch offices for any additional information or assistance.

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Dow Corning
FIRST IN SILICONES

Truckstell Overdrive

(*Continued from page* 50)

partial depression of the clutch pedal. The clutch control assures return to direct drive when the car is stopped and has to be re-started through the gears.

The accelerator pedal normally governs the shift into overdrive or vice versa. To go into overdrive it is only necessary to release the accelerator and the torque reversal, when the car starts to drive the engine, causes the overdrive to engage noiselessly. To get back into normal drive, the accelerator is pressed all the way down.

The cutaway illustration shows the relationship of the various elements. When the overdrive control is disengaged by pressing down the overdrive knob, the jaw clutch locks the sun and internal gears together and direct drive is engaged.

When the control knob is pulled up and latched, it shifts, via shifter yoke, the double end jaw clutch from rear or locked direct drive position to forward or overdrive position. In the latter position, it couples the sun gear to the flywheel control. It is held in engagement by spring pressure on the upper end of the control cable. The jaw clutch is a ratchet type that automatically disengages should the car be moved backward while the engine is dead, the transmission gears engaged, and control in "overdrive" position. The toggle lever mechanism for holding the jaw clutch in position is shown at the side of the illustration.

Direct drive can be obtained when the overdrive clutch is engaged. In this case, the drive is through an overrunning clutch. This same clutch also acts as a "hill-holder" when the car stops. Note that it is only necessary to release the brake bar by pulling out the locking pin to drop into direct drive in this way. When in direct drive, the overdrive flywheel turns at the same speed as planetary gear—which of course, in direct drive, is engine speed.

Going into overdrive from direct drive is done by torque reversal. That is, the accelerator is released enough to allow the car to drive and overrun the engine. The torque reversal causes the sun pinion to reverse direction—this action releases the overrunning clutch and it turns flywheel in a counter direction. This winds up the release spring on the pawl plate as it pulls the brake bar into engagement with the flywheel. The latter stops rotating. Once secured, the flywheel and sun pinion which is attached to it stop rotating. Then the planetary gears go into action, and overdrive is established.

When the locking pin is in position into place behind the brake bar it holds it and the flywheel stationary. The release spring on the pawl plate is wound up. The overdrive is in full operation, but can be released instantly by retracting the locking pin.

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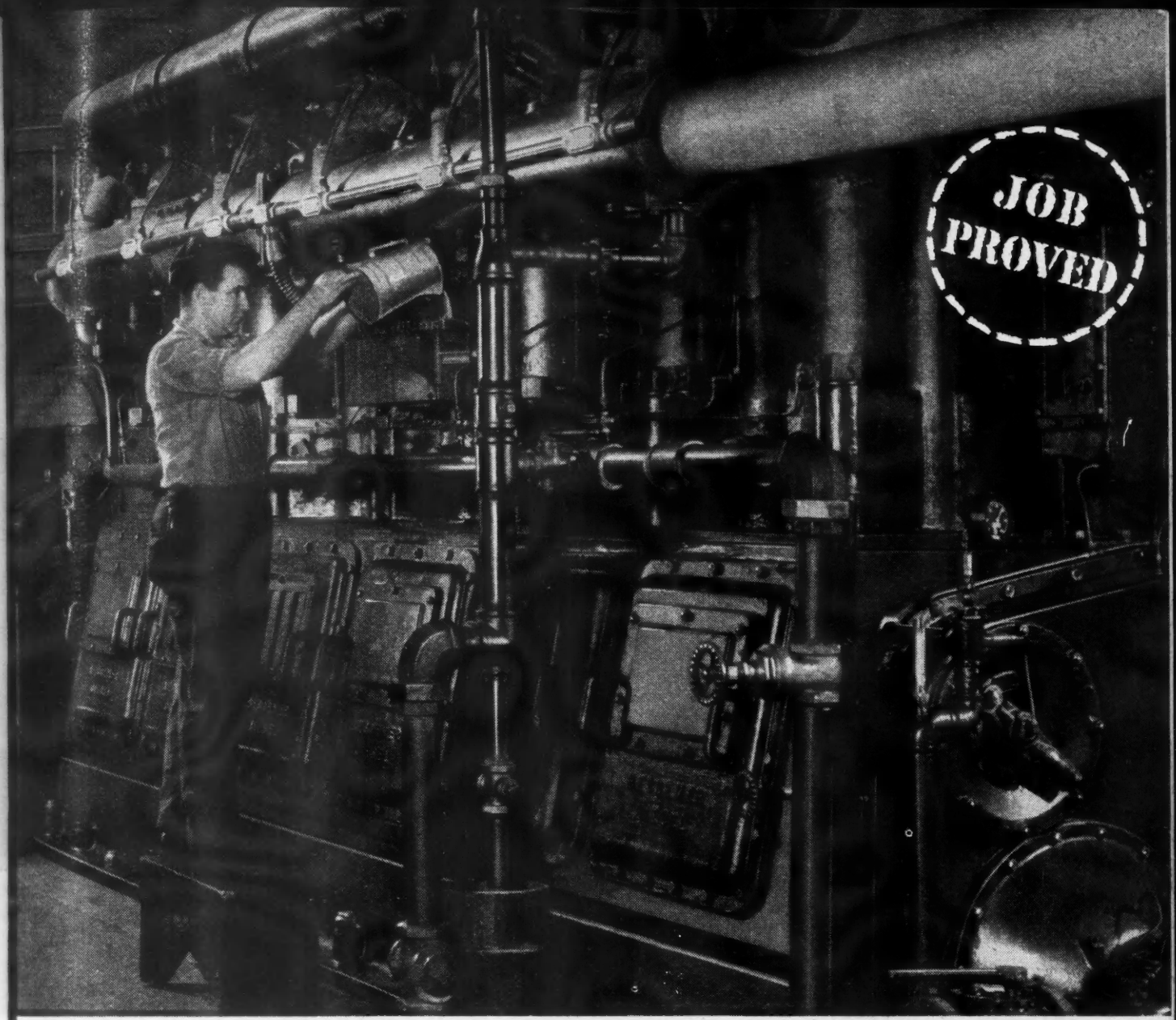

4,200 HOURS' OPERATION—STILL SLUDGE-FREE

Sun Diesel Lubricating Oil Almost Good As New After Outlasting a Competitive Product 5 to 1

A prominent manufacturer uses 6-cylinder, 4-cycle diesels to generate power. Recently, at the suggestion of one of our engineers, a Sun diesel lubricating oil was tried in one of the units.

Results were impressive. Inspected after three months, the engine was found to be in the cleanest condition since installed. In tests run against competitive oils, one manufacturer's product sludged up in 600 hours. Yet the Sun oil was practically as good as new after 3,000 hours, showing but a slight increase in neutralization number. In further tests, the Sun oil ran 4,200 hours in six months' operation without a change; the engine remained clean and sludge-free, and showed no signs of wear.

On the basis of this performance, the plant has extended the use of Sun oil to other diesel units.

Here is just one example of the records being set by Sun "Job Proved" lubricants in all their wide applications. You can rely on Sun products to keep diesels, turbines, steam engines and other power equipment operating smoothly and with minimum maintenance. To get complete information call the nearest Sun Office. For Technical Bulletin "Lubrication of Diesel Engines," write Department AA-10.

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"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

Tractor Plant

(*Continued from page 32*)

cutters, all with cemented-carbide inserts. In the second unit the frame is turned to present the two ends which are rough- and finish-milled to a length of 30.255 — 30.245 in. This unit has four, eight-in. diameter cutters, and two, 14-in. cutters, all fitted with cemented-carbide inserts.

This is followed by three W. F. & John Barnes transfer machines of automatic through type. The first of these is an eight-station machine for drilling, reaming, and tapping, also milling the idler bosses. The arrangement in this unit is shown in Table 1.

The second of the W. F. & John Barnes transfer machines in this line is a six-station machine for drilling, reaming, and tapping both sides and the bottom face.

The third W. F. & John Barnes unit is a four-way boring machine for rough- and semi-finish boring of side bores, end bores, idler hole, and bores in the inner wall.

The operations in the preceding machine held to rough- and semi-finish stages in preparation for finish-boring. This is done in a three-way Ex-Cell-O precision boring machine fitted with cemented-carbide-tipped cutters in the boring bars.

In addition to the preceding transfer machines, they have installed a number of the Natco Holeway transfer machines on the engine crankcase machine lines. First of these in the Cub crankcase line is a Natco three-way, five-head, Holeway transfer unit having twelve stations with automatic indexing. The sequence of operations is as shown in Table 2.

Another of the Natco transfer units on the same line is a five-way, eight-head machine with a 13-station automatic indexing fixture. This machine does the drilling, reaming, and chamfering of holes in both sides of the case and at the top of the block, including drilling of the valve guide and tappet holes.

From the standpoint of departmental layout it is interesting to note that the rear frame machine line, described earlier, is arranged to feed finished frames directly to the start of the sub-assembly of the tractor. The sub-assembly is progressively built up as it moves on the power-driven floor conveyor. Major sub-assemblies are built on short lines at right angles to the assembly conveyor directly at points of installation. When the tractor is completely integrated except for wheels and tires and some outside sheet metal, it is transferred onto a heavy duty monorail conveyor for transport through the water-wash, paint spray booth, and overhead drying oven.

The plant has two final tractor assembly lines—one exclusively for the high production "Cub" model and another on which the Super "A" and "C" models are built.

As tractors issue from the drying ovens, they remain suspended on the monorail conveyor to facilitate installation of the wheel and tire assemblies which reach this station on an overhead conveyor leading from wheel and tire assembly and scheduling.

Engines are machined in another wing and are assembled on a separate power driven assembly line. Completed engines are routed directly to the dynamometer room where each engine is run under power for 45 minutes.

Since the induction hardening department is said to be one of the largest and most comprehensive to be found in this country, it may be well to make some brief comment on it. The metallurgical department has given considerable attention to this technique and has selected a large number of gears and shafts for selective hardening or hardening of the entire part. Their studies have lead to the adoption of several unique types of equipment.

Among the equipment in this department are two large six-station Tocco hardening machines fitted with power-driven heads for rotating the work, and with large quenching tanks. The department also boasts a battery of four Westinghouse electronic induction hardening machines of various types and sizes.

KEEPING ABREAST OF POWER PROGRESS . . . . . .

The NEW OLIVER "88" has dust protection by DONALDSON

Oliver engineers anticipated that this new tractor for all-around farm use would do most of its work under dusty field conditions. To guard the engine against abrasive dust they specified Donaldson Oil-Washed Air Cleaners as factory equipment.

New developments in power machinery often present new problems in dust control. Donaldson research, engineering and testing facilities are available to all manufacturers in solving these problems.

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HIGH-TENSILE STEEL

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Telltale Isotopes

(*Continued from page 43*)

DOW CHEMICAL CO.—We are using radiocarbon (C 14) for two research projects which could not otherwise have been undertaken. The first of these is a study on laboratory animals to determine the toxicological effects of some common chemicals which find wide-spread uses in everyday life. The second problem is the detection of carbon in metallic magnesium to determine the role of carbon-containing compounds in altering the grain size and thus physical properties of the metal. In both of these problems the radioisotope furnishes a method of distinguishing carbon from one source from all other carbon in the experimental system as well as providing a more sensitive method of analysis than has been available before.

GENERAL ELECTRIC CO.—An investigation of high temperature alloys, as applied to the gas turbine field, is being carried out with the use of radioisotopes as tracers. These radioistopes offer a means of studying an individual component, in a multi-component system, entirely independent of the other elements which may be present. Such an investigation is impossible without the use of radioisotopes.

Radiotungsten (W 185) has been added to several melts of high temperature alloys and numerous autoradiographs have been made. Generally speaking, the autoradiographs do not have the high degree of clarity that is required but enlargements of 50 diameters have been made with success. Efforts are being made at the present time to produce autoradiographs with better clarity.

B. F. GOODRICH CO.—We have been using radioactive sulfur (S 35) to study the mechanism of vulcanization of rubber. This is one of the fundamental problems in the science of rubber and is practically unsolved in the sense that we do not understand exactly what happens. By using radioactive sulfur we hope to determine more definitely the disposition of this vulcanizing agent in the final product.

Radioactive iodine (I 131) has been used for measuring the thickness of thin films in the neighborhood of 1 micron, which are difficult to measure by more conventional methods. This work is part of an attempt to understand the mechanism by which silicones reduce the adhesion of ice to rubber-like materials. This reduction plays an important part in the outstanding improvements that have been made recently in De-Icers for keeping aircraft free of ice.

Radioactive phosphorus (P 32) has been used in several projects, one of which is concerned with improving abrasion tests, and in particular tire tread wear tests which are now slow and expensive.

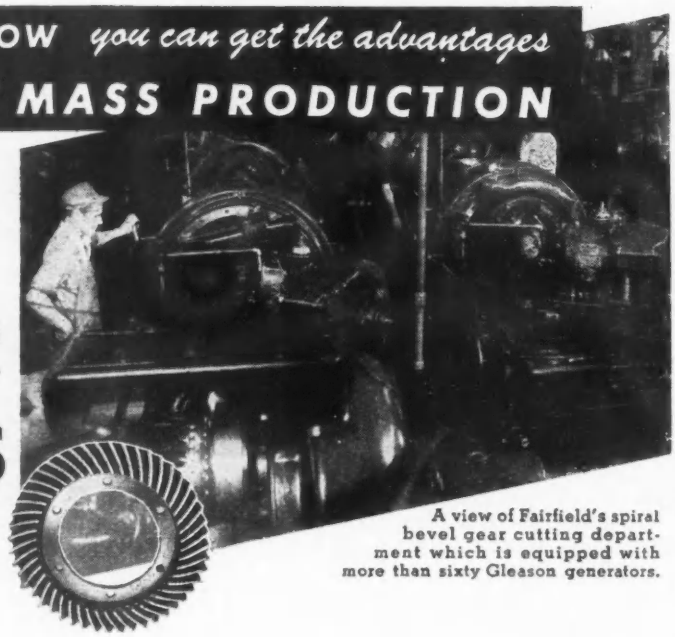
GOODYEAR TIRE AND RUBBER CO.—The problem of gaging the thickness of extremely thin film has long been a headache in industry. The average thickness of a sheet of Pliofilm, a Goodyear product, is about one-thousandth of an inch. Mechanical gages such as are now in use are difficult to use since the tiniest change in the pressure of the gage on the film will give a false reading. Present gages read with only dubious accuracy to a ten-thousandth of an inch.

The usual mechanical gage compresses the film between a metallic foot and an anvil. The theory is that the weight of the foot will provide the same pressure but it is apparent that the softness of the film will affect the result. Various refinements may be incorporated but one difficulty about using all such gages in conjunction with a production line is that either the progress of the film must be halted for gaging purposes or a piece of film must be cut from the sheet and subjected to gaging.

The new radioactive gage, using radiocarbon (C 14), makes it possible to gage a sheet of Pliofilm or other film continuously as it comes from the

(*Turn to page 96, please*)

HERE'S HOW *you can get the advantages of* MASS PRODUCTION ...for YOUR GEARS



A view of Fairfield's spiral bevel gear cutting department which is equipped with more than sixty Gleason generators.

YOU don't have to be big to get the benefits of MASS PRODUCTION when it comes to GEARS. Fairfield gives you the economy . . . the high production rates . . . the high uniformity of product made possible by big volume output with modern, high speed equipment. Rather than make a big investment in plant, machinery, and manpower, many gear users, large and small, now depend on Fairfield! It's a service that pays; make inquiry today.

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SPUR. Straight, helical, and internal. Sizes from 16 pitch, 1½" dia. (approx.), to 1½ pitch, 36" dia. (approx.).

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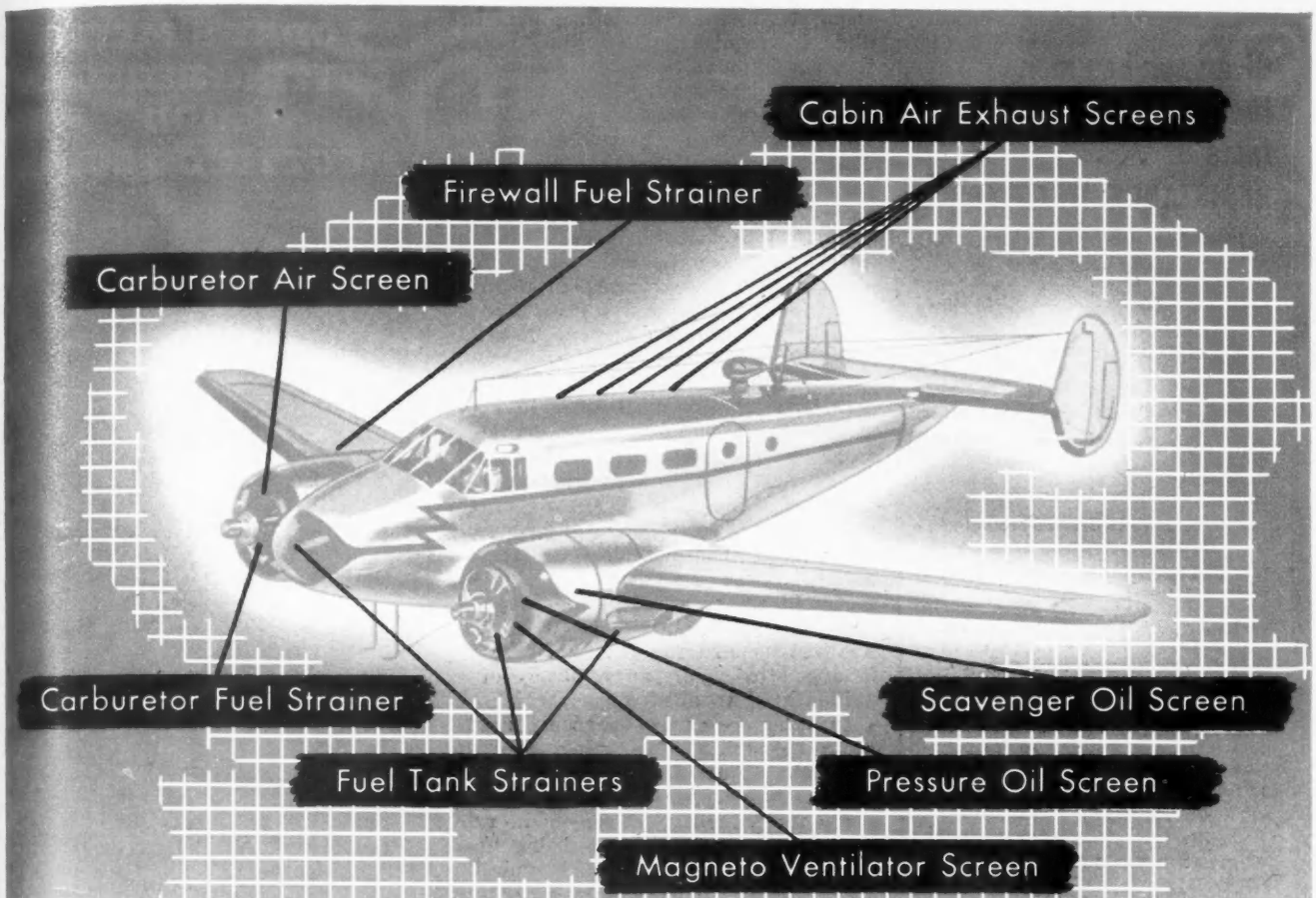

wire cloth

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GENERAL ELECTRIC

rolls. No mechanical contact with the film is required. The film passes through a slot in the gage. Below this slot there is a small bit of carbon 14. Above the slot there is an ionization chamber in which is produced a minute electrical current by the rays from carbon 14. This current is amplified by sub-miniature vacuum tubes to the point where it is sufficiently large to operate an ordinary electric meter which will then indicate the strength of the rays. Further amplification could be used to actually control the film gage by regulation of the speed of the production machinery.

Carbon 14 gives off only a weak stream of beta-rays. These are electrons like the electrons released by the filament of an ordinary radio vacuum tube. The number of electrons getting through the sheet of film depend upon its thickness. Consequently the meter can be graduated to read directly in thickness of film. The new gage will now read with accuracy to a hundred-thousandth of an inch but it is hoped to attain an accuracy of a millionth of an inch.

In other research programs radioactive phosphorus is being used to study the diffusion rate of plasticizers. Radioactive copper is being used to study the solubility of copper in rubber. Radioactive sulfur is being used to measure the migration and solubility of sulfur in rubber and investigating the chemistry of vlucanization.

INDUSTRIAL RADIOGRAPHY LABORATORY—To date our research has dealt with the use of radiocobalt (Co 60) as a high energy gamma-ray source for radiography. The gamma-ray source from Co 60 should increase the depth of penetration for radiography up to 15 inches of steel. Contrary to what was expected the gamma-rays from Co. 60 do not behave in accordance with the same energy levels obtained in the 1,000,000 volt X-ray machine.

ARTHUR D. LITTLE, INC.—Radio-sulfur (S 35) has been used to study the role of sulfur in the coking process for the steel industry. This study could not have been conducted without radiosotopes and was aimed at the ultimate production of better quality steel. Results have shown that low sulfur coke results only when low sul-

(*Turn to page 98, please*)

Classified Advertisement

AUTOMOTIVE TIE ROD END MANUFACTURER DESIRED FOR EXTREMELY MERITORIOUS PATENTED AUTOMOTIVE TIE ROD END EMPLOYING ADVANCED DESIGN PRINCIPLES. AVAILABLE ON ROYALTY OR SIMILAR ARRANGEMENT; OR, WOULD WELCOME A COST PLUS MANUFACTURING ARRANGEMENT WHEREAS AN AVAILABLE SALES ORGANIZATION COULD BE UTILIZED. LARGE SALES VOLUME POSSIBLE. ADDRESS REPLIES TO BOX NO. 56, AUTOMOTIVE INDUSTRIES.

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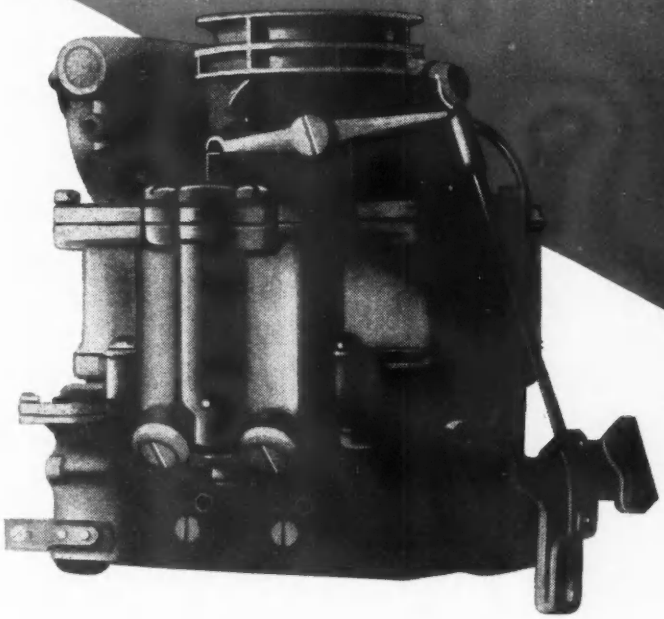

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fur coal is used in present typical coking practice. S 35 is being used to obtain a better understanding of the role of sulfur as an agent in the processing of metals.

MELLON INSTITUTE—We have been using carbon monoxide containing radioactive carbon (C 14) in an investigation of the mechanism of the synthesis of hydrocarbons by the Fischer-Tropsch process. The use of this radioactive carbon has enabled us to show that the hydrocarbon synthesis does not take place through the intermediate formation of metallic carbides but through some mechanism, the details of which are not yet known. The carbide theory for formation of hydrocarbons is one that has been generally accepted as correct since its initial formulation by Dr. Fischer who was the originator of the synthetic gasoline process. It is hoped that this continued use of radioactive carbon will permit the elucidation of the detailed mode of operation for this important process for the manufacture of synthetic fuels from coal or natural gas.

SHELL DEVELOPMENT CO.—By using radiocarbon (C 14) we have been able to study problems that could not be attacked in any other way. We have followed the course of particular carbon atoms in complex catalytic hydrocarbon reactions. Such experiments will surely lead to a better understanding of chemical reactions involving petroleum and petroleum products. We have also used C 14 in special analytical problems where detection of radioactivity was the only practical analytical procedure.

SINCLAIR REFINING CO.—Our studies with radiocarbon (C 14) will deal with the mechanisms of catalytic cracking and Fischer-Tropsch reactions and with the adsorption of very small quantities of radioactive materials.

SOCONY-VACUUM LABORATORIES—In the study of oil production from oil sands, the nature of the three phase flow of oil, water, and gas is a basic problem, since the most efficient exhaustion of present petroleum reservoirs depends upon the nature of this flow. To help in understanding this problem we are using redioactive cobalt (Co 60) to study the permeability of naturally occurring or artificially produced porous media to the flow of oil, gas and water mixtures. By using radioactive tracers in the oil, the location and quantity of oil flowing through the medium can be determined internally by a Geiger counter.

STEVENS INSTITUTE OF TECHNOLOGY—The research project utilizing radioactive isotopes is engaged in the study of self-diffusion in stressed metals. The results will contribute materially to the theory of solids in general, as well as being of importance in applied metallurgy. The use of radioactive isotopes of zinc and copper as tracer materials is essential to this work.

THE TEXAS CO.—Radiocarbon (C 14) will be invaluable in determining the chemical mechanism of the formation of petroleum products in the catalyzed hydrogenation of carbon monoxide. A more complete understanding of this mechanism can be expected to result in a greater production of synthetic petroleum, a matter of vital concern to the United States.

WESTINGHOUSE ELECTRIC CORP.—We have been using radioactive carbon (C 14) for research investigations in metallurgy. More specifically we are attempting to determine the diffusion of carbon in alpha (body-centered cubic) iron. This subject is of theoretical importance because of its bearing on the aging of steels, the magnetic after-effect, and the elastic after-effect; it is of practical importance in decarburization of plain carbon and alloy steels.

We have used radioactive phosphorus (P 32) in measuring the amount and location of phosphorus in steel and alloys by the autoradiographic technique.

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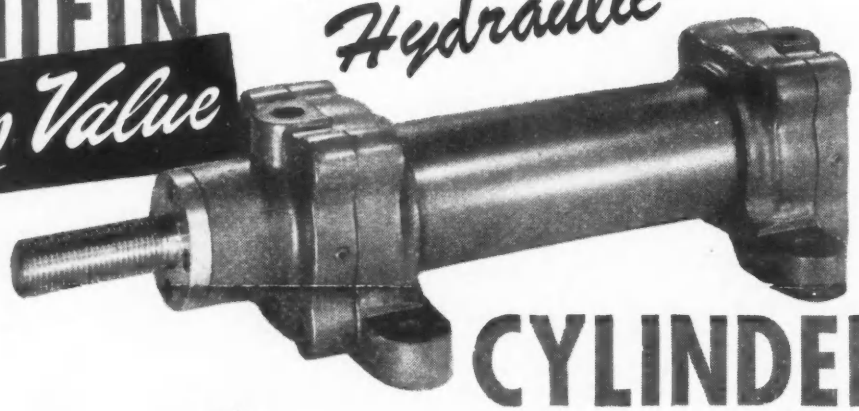

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(*Turn to next page please*)

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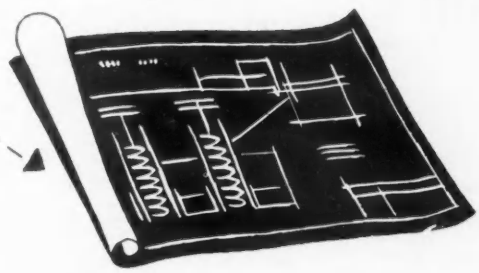

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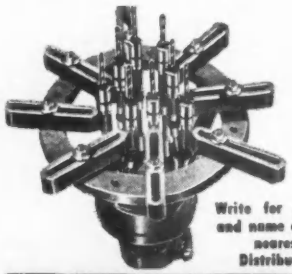

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Vauxhall Price Correction

In the Oct. 1 issue of AUTOMOTIVE INDUSTRIES, page 41, it was incorrectly stated that the selling prices of the new Vauxhall Velox and Wyvern sedans are £1720 and £1400, respectively, and the British flat rate tax on passenger cars is £40. The correct amounts are $1720, $1400 and $40, respectively.

AAPM Head Sees Increase In Strikes Next Year

Frank Rising, general manager of Automotive & Aviation Parts Mfrs. Assoc., believes that there will be an upsurge in labor trouble next year. He says that 1949 will see more trouble in terms of strikes and lost manhours than in any year since 1946 as unions try to regain their former position of political favorites. He predicted that the unions would try to frighten Congress into concessions regardless of which party is in the majority, and that they will fail in the attempt. He added that public opinion still favors protecting the public interest and will continue to do so for some time. He added that if any changes are made in the Taft-Hartley Act they would be towards more restrictions on unions.